

**UCDAVIS**  
**GENERAL CATALOG**

**2016–2017 • 2017–2018**



## UC Davis Academic Calendar 2016–2018 \*

\* Dates and times subject to change without notice.

	Fall 2016	Winter 2017	Spring 2017	Fall 2017	Winter 2018	Spring 2018	Summer Sessions 2016
Registration appointment times available.	May 2	Oct 24	Jan 30	May 8	Oct 30	Jan 29	Session One: Jun 20–Jul 29
Pass One Registration (assigned appointments)	May 9	Oct 31	Feb 6	May 15	Nov 6	Feb 5	Session Two: Aug 1–Sep 9
Pass Two Registration (assigned appointments)	Aug 22	Nov 21	Feb 27	Aug 21	Nov 27	Feb 26	
Last day to:	Sep 15	Dec 15	Mar 15	Sep 15	Dec 15	Mar 15	
• Pay fees to avoid classes being dropped. Students with an unpaid balance will be dropped from classes.							

- Petition for classification to resident status.

Quarter begins	Sep 19	Jan 6	Mar 30	Sep 25	Jan 5	Mar 29	
Instructional Startup Activities	Sep 19	Jan 6	Mar 30	Sep 25	Jan 5	Mar 29	
Instruction begins	Sep 21	Jan 9	Apr 3	Sep 27	Jan 8	Apr 2	

10th day of instruction; last day to:	Oct 4	Jan 23	Apr 14	Oct 10	Jan 22	Apr 13	
• Make final late payment of registration fees with penalty.							
• Drop 10-day-drop courses.							
• Change student status (part-time/full-time).							
• Last day to file for PELP.							
12th day of instruction; last day to add courses.	Oct 6	Jan 25	Apr 18	Oct 12	Jan 24	Apr 17	
20th day of instruction; last day to 20-day-drop courses.	Oct 18	Feb 6	Apr 28	Oct 24	Feb 5	Apr 27	

25th day of instruction; last day to:	Oct 25	Feb 13	May 5	Oct 31	Feb 12	May 4	
• Opt to take courses on a P/NP or S/U basis.							
• Change units in a variable unit course.							
Instruction ends	Dec 2	Mar 17	Jun 8	Dec 8	Mar 16	Jun 7	
Final Examinations	Dec 5–9	Mar 20–24	Jun 9, 12–15	Dec 11–15	Mar 19–23	Jun 8, 11–14	
Quarter ends	Dec 9	Mar 24	Jun 15	Dec 15	Mar 23	Jun 14	
Commencement	Dec 10	—	Jun 16–18	Dec 16	—	Jun 15–17	

Academic and Administrative Holidays	Nov 11 Nov 24–25 Dec 23 & 26 Dec 30 & Jan 2	Jan 16 Feb 20	Mar 31 May 29	Nov 10 Nov 23–24 Dec 22 & 25 Dec 29 & Jan 1	Jan 15 Feb 19	Mar 30 May 28	
Last day to file minor with the Dean's Office or the Biology Academic Success Center. †	Oct 4	Jan 23	Apr 14	Oct 10	Jan 22	Apr 13	
Undergraduate Admission	Nov 30, 2015 Jul 31, 2016	Oct 31, 2016 Jan 30, 2017	Feb 1–Mar 17 Jul 31, 2017	Aug 1–Sep 15 Jul 31, 2017	Nov 8–Dec 8 Oct 30, 2017	Feb 1–Mar 16 Oct 30, 2018	
Last day to file an application for admission scholarships; usually closed for winter and spring.							
Last day to file a readmission application for return to undergraduate status.	Jul 31, 2016	Oct 31, 2016	Jan 30, 2017	Jul 31, 2017	Oct 30, 2017	Jan 29, 2018	

## Filing for Graduation

Filing period for students who expect to complete work for a bachelor's degree to file for graduation with the Office of the University Registrar. †	Aug 1–Sep 9	Nov 8–Dec 2	Feb 1–Mar 17	Aug 1–Sep 15	Nov 8–Dec 8	Feb 1–Mar 16	
Last day to file minor with the Dean's Office or the Biology Academic Success Center. †	Oct 4	Jan 23	Apr 14	Oct 10	Jan 22	Apr 13	
Undergraduate Admission	Nov 30, 2015 Jul 31, 2016	Oct 31, 2016 Jan 30, 2017	Feb 1–Mar 17 Jul 31, 2017	Aug 1–Sep 15 Jul 31, 2017	Nov 8–Dec 8 Oct 30, 2017	Feb 1–Mar 16 Oct 30, 2018	

- Last day to file an application for admission scholarships; usually closed for winter and spring.
- Last day to file a readmission application for return to undergraduate status.

† Sep 2017, is Jul 7.

‡ Sep 2018, is Jul 7.

• Sep 2016, is Jul 22.

• Sep 2017, is Jun 1–Jul 28.

• Sep 2018, is Jun 1–Jul 28.

• Priority filing period for grants, loans, work-study and California Student Aid awards for 2017–2018; Oct 1, 2016–Mar 2, 2017.

• Filing period for continuing undergraduate scholarship application for 2017–2018; Oct 1, 2016–Jan 4, 2017.

• Filing period for students graduating:

• Sep 2016, is Jun 1–Jul 22.

• Sep 2017, is Jun 1–Jul 28.

• Sep 2018, is Jun 1–Jul 28.

• Deadline for graduating students to file a minor program with the Dean's Office or the Biology Academic Success Center:

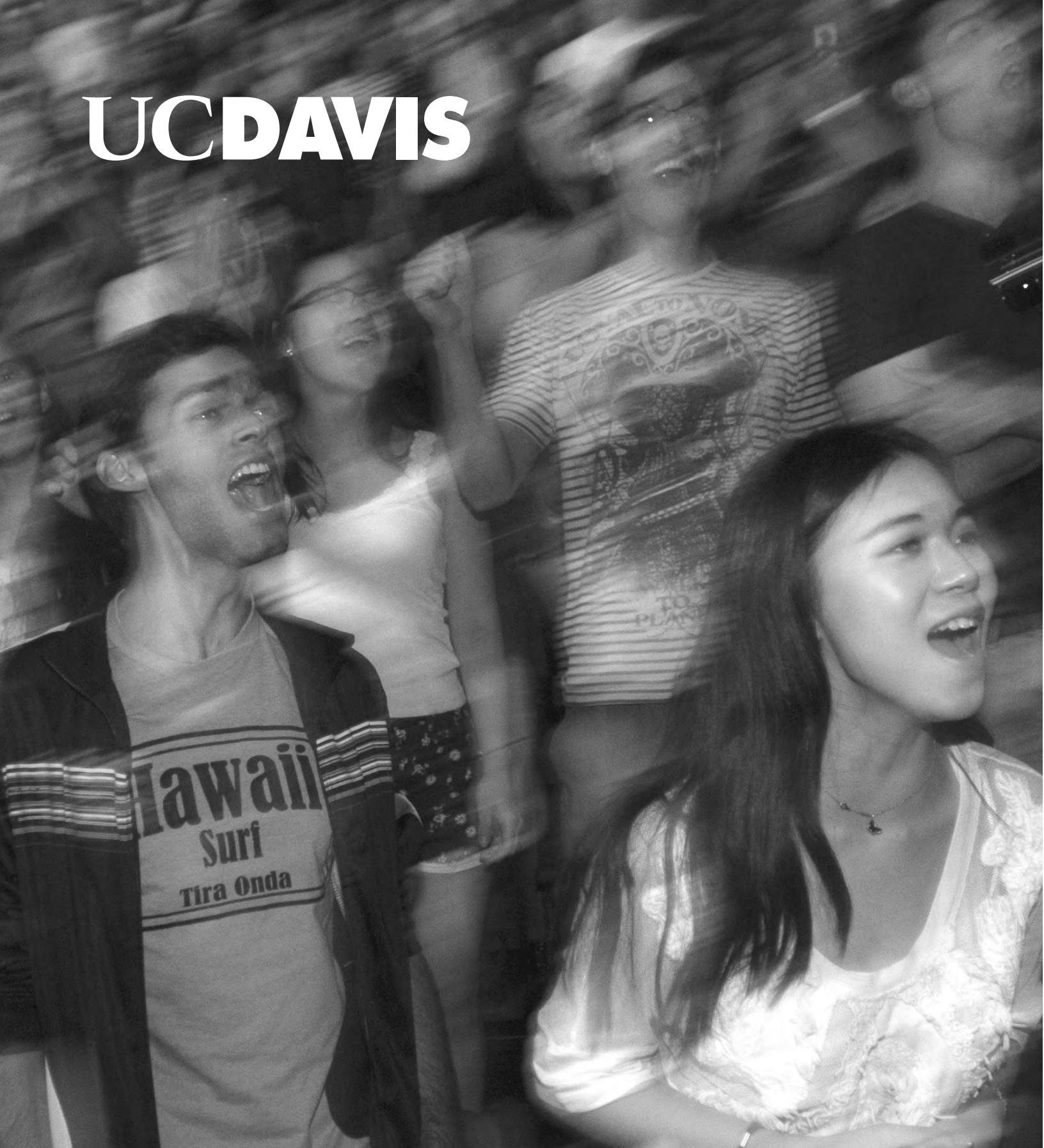
• Sep 2016, is Jul 7.

• Sep 2017, is Jul 7.

• Sep 2018, is Jul 7.



# UCDAVIS



GENERAL CATALOG 2016–2017 • 2017–2018

# UCDAVIS

June 2016      Volume 48

## **Published by**

Office of the University Registrar  
University of California  
One Shields Avenue  
Davis, CA 95616-8692

## **THE PROVISIONS OF THIS CATALOG REFLECT INFORMATION AS OF THE DATE OF PUBLICATION.**

**NOTICE:** This *General Catalog* is not a contract nor an offer to enter into a contract. While every effort is made to ensure the accuracy of the information provided in this *General Catalog*, it must be understood that all courses, course descriptions, designations of instructors, curricular and degree requirements and other academic information described herein are subject to change or elimination at any time without notice or published amendment to this catalog. In addition, The University of California reserves the right to make changes at any time, without prior notice, to other programs, policies, procedures and information, which are described in this *General Catalog* only as a convenience to its readers. Fees and all other charges are subject to change at any time without notice. Students should consult the appropriate academic or administrative department, school, college, graduate division or other service provider for currently accurate information on any matters described in this *General Catalog*; contact information is available at <http://www.ucdavis.edu>.

**IT IS THE RESPONSIBILITY OF THE INDIVIDUAL STUDENT TO BECOME FAMILIAR WITH THE ANNOUNCEMENTS AND REGULATIONS OF THE UNIVERSITY PRINTED IN THIS GENERAL CATALOG.**

The University of California, Davis, will provide assistance to the visually impaired regarding the information contained in this catalog. Questions should be directed to the office or department concerned.

The *General Catalog* may be purchased from UC Davis Repro Graphics; see <http://catalog.ucdavis.edu/>.

## **Credits**

### **Editorial and production coordination:**

Randall Larson-Maynard, Senior Editor;  
Office of the University Registrar

### **Cover and graphic design:**

Office of Strategic Communications; Creative Communications

### **Photography:**

Mediaworks

## **WELCOME TO UC DAVIS**

We're delighted you've chosen our campus to pursue your academic goals. All of us—faculty, staff, campus leadership and alumni—are committed to helping you succeed.

In your time at UC Davis, you will acquire knowledge and skills that will help you shape the rest of your life. In whatever program you study, you will receive an exceptional education and a degree respected by graduate schools and employers worldwide.

Our philosophy of learning, discovery and engagement ensures you will graduate with a strong academic foundation and an understanding of how your learning is relevant to the greater world.

UC Davis has a century of commitment to public service and seeking solutions to society's critical issues. We encourage you to integrate these goals into your education.

Your passion, intellectual curiosity and vision give our campus the energy and inspiration that make UC Davis special and your time here meaningful.

We are extremely proud of UC Davis. Our alumni have made significant and lasting contributions to society as leaders in government, business, technology, media and the arts. They share their knowledge and resources with the campus and help students build social and career networks before they graduate.

Members of our faculty have won MacArthur genius grants, Pulitzer prizes, Fulbright scholarships and election to the nation's top academies of the arts and sciences. They connect with students in the classroom, during first-year seminars and through research, arts and honors activities.

UC Davis continues to grow and offer new and exciting opportunities to learn and progress. We're looking forward to completion of the spectacular new Manetti Shrem Museum of Art and Ann E. Pitzer Center, as well as the renovation of our historic student union. Our new International Complex, scheduled for opening in the fall of 2016, will be a welcoming environment for collaboration among students and scholars from around the world.

Together, we are building a community that honors our diversity as individuals and reflects our belief in a shared set of values and mutual respect. We encourage you to explore together all that UC Davis has to offer.

Congratulations on becoming an Aggie!

Carolyn Thomas  
Vice Provost & Dean for  
Undergraduate Education

Elias Lopez  
University Registrar



## ADDRESS DIRECTORY

University of California  
One Shields Avenue  
Davis, California 95616  
530-752-1011; main campus number  
<http://www.ucdavis.edu>

### Visitor Services Office

UC Davis Welcome Center  
530-752-8111  
(Campus tours, maps and information)

### Campus Information Center

Memorial Union  
530-752-2222

### Offices of the Chancellor and Provost

Mrak Hall, fifth floor  
530-752-2065

### College of Agricultural and Environmental Sciences

150 Mrak Hall  
530-752-0108

### College of Biological Sciences

202 Life Sciences  
530-752-0410

### College of Engineering

1042 Kemper Hall  
530-752-7642

### College of Letters and Science

200 Social Sciences and Humanities Building  
530-752-0394  
Academic Counseling: 530-752-0392

### Graduate Studies

250 Mrak Hall  
530-752-0650

### Graduate School of Management

Gallagher Hall  
530-752-7658

### School of Law

2020 King Hall  
530-752-0243

### School of Medicine

4610 X Street, Sacramento  
916-734-7131

### School of Veterinary Medicine

Surge IV  
530-752-1360

### Office of Summer Sessions

1350 Surge III  
530-752-7611

### University Extension

1333 Research Park Drive  
530-757-8777

### News Service

334 Mrak Hall  
530-752-1930

### Legal Analyst—Residence Matters

University of California Office of the President  
1111 Franklin Street, 8th Floor  
Oakland, CA 94607-5206

### Admissions

Undergraduate	Undergraduate Admissions UC Davis Welcome Center 550 Alumni Lane 530-752-2971 Education Outreach Program (EOP) Corner of East Quad and Shields Avenue 530-752-2971
Graduate	Office of Graduate Studies Admissions 250 Mrak Hall 530-752-0650
Law	School of Law Admissions 1380 King Hall 530-752-6477
Management	Graduate School of Management Admissions Gallagher Hall 530-752-7658
Medicine	School of Medicine Admissions and Outreach 4610 X Street, Suite 1202, Sacramento, CA 95817 916-734-4800
Veterinary Medicine	School of Veterinary Medicine Admissions 114 Haring Annex 530-752-1383

### Office of the University Registrar

3100 Dutton Hall; third floor  
530-752-3639

### Financial Aid Office

1100 Dutton Hall, first floor  
Undergraduate: 530-752-2390  
Graduate: 530-752-9246  
Student Employment: 530-752-0520

### Undergraduate Education

1383 Surge III  
530-752-6068

### Undergraduate Scholarship Office

2128 Dutton Hall, second floor  
530-752-2804

### Fellowships and Graduate Scholarships

250 Mrak Hall  
530-752-0650

### Teaching and Research Assistantships

Write to department or group concerned.

### Associated Students of the University of California, Davis (ASUCD)

Memorial Union, third floor  
530-752-3632

### Student Disability Center

54 Cowell Building  
530-752-3184  
TTY: 530-752-6833

### Student Health and Wellness Center

Student Health and Wellness Center  
530-752-2300

### Student Housing Office

160 Student Housing  
530-752-2033

## THE BOARD OF REGENTS

Governance of the University of California is entrusted to a corporation called the Board of Regents. Of the individuals composing the board, eighteen are California citizens appointed by the governor, and seven, including the president of the University and the governor of California, serve ex officio. A Student Regent is selected each year from a list of names submitted to the board by the Student Body Presidents' Council.

The Regents delegate authority in academic matters to the Academic Senate of the faculty, which determines academic policy and supervises the instructional activities of the entire University. All of the permanent faculty, as well as key administrators, are members of the Senate.

The Regents delegate authority for the organization of the University to the president. Janet Napolitano is President and head of the Universitywide administration. Authority for the administration of each campus is delegated to a chancellor.

## THE REGENTS OF THE UNIVERSITY OF CALIFORNIA

### Ex Officio Regents

Jerry Brown  
*Governor of California and President of the Regents*

Gavin Newsom  
*Lieutenant Governor of California*

Anthony Rendon  
*Speaker of the Assembly*

Tom Torlakson  
*State Superintendent of Public Instruction*

Janet Napolitano  
*President of the University*

Yolanda Gorman  
*President of the Alumni Associations of the University of California*

Rodney Davis  
*Vice President of the Alumni Associations of the University of California*

### Appointed Regents

Current term expires on March 1 of year indicated.

Richard C. Blum, 2026

William De La Peña, 2018

Gareth Elliott, 2025

Russell Gould, 2017

Eddie Island, 2017

George Kieffer, 2021

Sherry L. Lansing, 2022

Monica Lozano, 2022

Hadi Makarechian, 2020

Eloy Ortiz Oakley, 2024

Abraham (Avi) Oved, 2016

*Student Regent*

Norman J. Pattiz, 2026

John A. Pérez, 2024

Bonnie Reiss, 2020

Richard Sherman, 2025

Bruce D. Varner, 2018

Charlene Zettel, 2021

### Faculty Representatives

Dan Hare, 2016  
James Chalfant, 2017

### Principal Officers of the Regents

Charles F. Robinson  
*General Counsel*

Jagdeep Singh Bachher  
*Chief Investment Officer*

Anne Shaw  
*Secretary and Chief of Staff*

Sheryl Vacca  
*Chief Compliance and Audit Officer*

## ADMINISTRATIVE OFFICERS OF THE UNIVERSITY

Janet Napolitano  
*President of the University*

Nina Robinson  
*Associate President and Chief Policy Advisor*

Aimee Dorr  
*Provost and Executive Vice President—Academic Affairs*

Rachael Nava  
*Executive Vice President—Chief Operating Officer*

Kimberly S. Budil  
*Vice President—National Laboratories*

Nathan Brostrom  
*Executive Vice President—Chief Financial Officer*

Charles Robinson  
*General Counsel and Vice President—Legal Affairs*

Jagdeep Singh Bachher  
*Vice President—Investments*

Julie Henderson  
*Senior Vice President—Public Affairs*

Nelson Peacock  
*Senior Vice President—Government Relations*

John D. Stobo  
*Executive Vice President—UC Health*

Judy Sakaki  
*Vice President—Student Affairs*

Pamela Brown  
*Vice President—Institutional Research and Academic Planning*

Dwaine B. Duckett  
*Vice President—Human Resources*

Glenda Humiston  
*Vice President—Agriculture and Natural Resources*

Sheryl Vacca  
*Senior Vice President and Chief Compliance & Audit Officer—Ethics, Compliance and Audit Services*

Tom Andriola  
*Vice President and Chief Information Officer—Information Technology Services*

William Tucker  
*Interim Vice President—Research and Graduate Studies*

Yvette Gullatt  
*Vice Provost—Diversity and Engagement*

Susan Carlson  
*Vice Provost—Academic Personnel and Programs*

## UNIVERSITY CHANCELLORS

Nicholas B. Dirks  
*Chancellor at Berkeley*

Linda P. B. Katehi  
*Chancellor at Davis*

Howard Gillman  
*Chancellor at Irvine*

Gene D. Block  
*Chancellor at Los Angeles*

Dorothy Leland  
*Chancellor at Merced*

Kim A Wilcox  
*Chancellor at Riverside*

Pradeep K. Khosla  
*Chancellor at San Diego*

Sam Hawgood  
*Chancellor at San Francisco*

Henry T. Yang  
*Chancellor at Santa Barbara*

George R. Blumenthal  
*Chancellor at Santa Cruz*

## ADMINISTRATIVE OFFICERS—UC DAVIS

### *Chancellor*

Linda P. B. Katehi, Ph.D.

### *Chancellor Emeriti (and years served)*

Theodore L. Hullar, Ph.D. (1987-1994)

### *Provost and Executive Vice Chancellor*

Ralph J. Hexter, Ph.D.

### *Vice Chancellors*

Harris A. Lewin, Ph.D.  
*Vice Chancellor—Research*

Dave Lawlor  
*Vice Chancellor & CFO—Finance Operations & Administration*

Julie Ann Freischlag, M.D.  
*Vice Chancellor—Human Health Sciences*

Shaun B. Keister, Ph.D.  
*Vice Chancellor—Development and Alumni Relations*

Adela de la Torre, Ph.D.  
*Vice Chancellor—Student Affairs and Campus Diversity*

### *Vice Provosts*

Maureen L. Stanton, Ph.D.  
*Vice Provost—Academic Affairs*

Joanna Regulska, Ph.D.  
*Vice Provost—Global Affairs*

Viji Murali, M.S.  
*Vice Provost and CIO—Information and Educational Technology*

Prasant Mohapatra, Ph.D.  
*Vice Provost—Graduate Education*

Carolyn Thomas, Ph.D.  
*Vice Provost—Undergraduate Education*

### *Associate Chancellor*

Karl M Engelbach, M.B.A.  
*Associate Chancellor—Office of the Chancellor*

Joanna Regulska, Ph.D.  
*Associate Chancellor—Global Affairs*

Marjorie M. Dickinson, B.A.  
*Assistant Chancellor—Government and Community Relations*

### *Associate/Assistant Vice Chancellors and Vice Provosts*

Rahim Reed, M.P.A., J.D.  
*Associate Executive Vice Chancellor—Campus Community Relations*

Emily Galindo, M.B.A.  
*Associate Vice Chancellor—Student Affairs (Divisional and Auxiliary Services)*

Milton Lang, Ed.D.

*Associate Vice Chancellor—Student Affairs (Student Life, Campus Community and Retention Services)*

John Campbell

*Associate Vice Chancellor—Student Affairs (Divisional Resources)*

Walter A. Robinson

*Associate Vice Chancellor—Student Affairs (Admissions & Enrollment Planning)*

J. Michael Allred, M.B.A.

*Associate Vice Chancellor—Finance, Operations & Administration (Financial Services & Administrative IT)*

Jill Parker, B.S.

*Associate Vice Chancellor—Finance, Operations & Administration (Safety Services)*

Susan Gilbert, M.S.

*Associate Vice Chancellor—Finance, Operations & Administration (Human Resources)*

Kelly Ratliff, M.B.A.

*Sr. Associate Vice Chancellor—Finance, Operations & Administration (Finance & Resource Management)*

Clayton Halliday, A.I.A.

*Associate Vice Chancellor—Finance, Operations & Administration (Design and Construction Management)*

Cindy Kiel, J.D.

*Executive Associate Vice Chancellor—Research (Research Administration)*

Paul Dodd, Ph.D.

*Associate Vice Chancellor—Research (Interdisciplinary Research and Strategic Initiatives)*

Dushyant Pathak, Ph.D., M.B.A.

*Associate Vice Chancellor—Research (Technology Management and Corporate Relations)*

Heather Young, Ph.D., R.N., F.A.A.N.

*Associate Vice Chancellor—Betty Irene Moore School of Nursing*

Jason Wohlman

*Associate Vice Chancellor—University Development*

Paul Prokop, M.A.

*Associate Vice Chancellor—University Development (School and Unit Programs)*

Chong Porter

*Associate Vice Chancellor—University Development (Health Sciences Development and Alumni Relations)*

Karl Mohr, M.A.

*Assistant Executive Vice Chancellor—Office of the Chancellor and Provost*

Richard R. Engel, M.A.

*Assistant Vice Chancellor—Alumni Relations*

Angela M. Joens, M.P.A.

*Assistant Vice Chancellor—University Development (Development Outreach)*

Brian Casey, B.A.

*Assistant Vice Chancellor—University Development (Planned Giving)*

Shelley Birdsong-Maddex

*Assistant Vice Chancellor—University Development (Foundation and Corporate Giving)*

Allen Tolleson

*Assistant Vice Chancellor—Finance, Operations, & Administration (Facilities Management)*

Diane Davies-Conley, C.P.A., M.B.A.

*Assistant Vice Chancellor—Finance, Operations & Administration (Chief of Staff/Business Client Manager)*

Robert Segar, M.L.A.

*Assistant Vice Chancellor—Finance, Operations & Administration (Campus Planning and Community Resources)*

Vacant

*Assistant Vice Chancellor—Finance, Operations & Administration (Capital Planning & Real Estate)*

Camille Kirk

*Interim Assistant Vice Chancellor—Finance, Operations &*

***Administration (Environmental Stewardship and Sustainability)***

Emily Prieto-Tseregounis, Ph.D.

*Assistant Vice Chancellor & Chief of Staff—Student Affairs  
(Communications and Administration)*

Adrienne Martin, Ph.D.

*Associate Vice Provost—Global Affairs*

Matthew Traxler, Ph.D.

*Associate Vice Provost—Undergraduate Education (Academic Planning)*

Phillip Kass,D.V.M., Ph.D.

*Associate Vice Provost—Academic Affairs*

Binnie Singh, M.A.

*Assistant Vice Provost—Academic Affairs*

Helen Schurke Frasier, Ph.D.

*Assistant Vice Provost & Chief of Staff—Undergraduate Education*

Marco Molinaro, Ph.D.

*Assistant Vice Provost—Undergraduate Education (Educational Effectiveness)*

***Chief Campus Counsel***

Jacob A. Appelsmith, J. D.

***Chief Executive Officer—Medical Center***

Ann Madden Rice, M.A.

***Ombuds***

Susan Kee-Young Park, J.D.

***University Librarian***

MacKenzie Smith

***Registrar***

Elias S. Lopez, Ph.D.

***Directors***

Roger Beachy, Ph.D.

*Director—World Food Center*

Teresa K. Gould

*Interim Director—Intercollegiate Athletics*

Jeremiah Maher

*Director—Internal Audit Services*

Deborah G. Agee

*Director—Financial Aid*

Richard R. Engel, M.A.

*Executive Director—Cal Aggie Alumni Association*

Emily Galindo, M.B.A.

*Executive Director—Student Housing*

Michelle Famula, M.D.

*Executive Director—Student Health & Wellness Center*

Elias S. Lopez, Ph.D.

*Executive Director—Student Affairs Office of Technology*

Don Roth, Ph.D.

*Executive Director—Mondavi Center for the Performing Arts*

Dana Topousis

*Executive Director—News & Media Relation*

***Agricultural and Environmental Sciences, College of***

Helene R. Dillard, Ph.D., Dean

Mary E. Delany, Ph.D., Executive Associate Dean

Ronald S. Tjeerdema, Ph.D., Associate Dean for Environmental Sciences

Edwin E. Lewis, Ph.D., Associate Dean for Agricultural Sciences

David C. Campbell, Ph.D., Associate Dean for Social/Human Sciences

Susan E. Ebeler, Ph.D., Associate Dean—Undergraduate Academic Programs

Jan W. Hopmans, Ph.D., Associate Dean—International Programs

Penny Herbert, Executive Assistant Dean—Administration

Julie Fritz-Rubert, Assistant Dean—College Personnel

Christine Schmidt, Assistant Dean—College Advancement

***Biological Sciences, College of***

Peter Wainwright, Ph.D., Interim Dean

Susan L. Keen, Ph.D., Associate Dean—Undergraduate Academic Programs

John Harada, Ph.D., Executive Associate Dean

Gregg Recanzone, Ph.D., Associate Dean for Research and Resources

Donna Watkins Olsson, M.P.P., Executive Assistant Dean

***Education, School of***

Vacant, Dean

Cynthia Carter Ching Ph.D., Associate Dean—Academic Programs and Instruction

Peter Mundy, Ph.D., Associate Dean—Academic Personnel and Research

Damian Chapman, MBA, Assistant Dean—Finance, Administration and Strategy Development

Vacant, Executive Director—Development and External Relations

***Engineering, College of***

Jennifer Sinclair Curtis, Ph.D., Dean

Jessie Catacutan, Executive Assistant Dean—Administration and Finance

James A. Schaaf, Ph.D., Associate Dean—Undergraduate Studies

C. P. (Case) van Dam, D. Engr., Associate Dean—Facilities and Capital Planning

Jean S. VanderGheynst, Ph.D., Associate Dean—Graduate Studies and Research

S. Felix Wu, Ph.D., Associate Dean—Academic Personnel and Planning

Bruce White, Ph.D., Executive Associate Dean

***Graduate Studies***

Prasant Mohapatra, Ph.D., Vice Provost—Graduate Education and Dean—Graduate Studies

Jean-Pierre Delplanque, Ph.D., Associate Dean

Chris Calvert, Ph.D., Associate Dean

Kellie Sims Butler, Ph.D., Assistant Dean

***Law, School of***

Kevin Johnson, J.D., Dean

Madhavi Sunder, J.D., Associate Dean—Academic Affairs

Craig Compton, J.D., Assistant Dean—Career Services

Karen L. Charney, Senior Director of Development

Hollis L. Kulwin, J.D., Senior Assistant Dean—Student Affairs

Kristen Mercado, J.D., Assistant Dean—Admission and Financial Aid

Brett C. Burns, Senior Assistant Dean—Administration

***Letters and Science, College of***

Susan Kaiser, Ph.D., Interim Dean—Division of Humanities, Arts, and Cultural Studies

Ian Blake, Assistant Dean—Division of Humanities, Arts, and Cultural Studies

Alexandra Navrotsky, Ph.D., Interim Dean—Division of Mathematical and Physical Sciences

Tracy Ligtenberg, Assistant Dean—Division of Mathematical and Physical Sciences

Li Zhang, Ph.D., Interim Dean—Division of Social Sciences

Steven Roth, M.B.A., M.A., Assistant Dean—Division of Social Sciences

Randolph M. Siverson, Ph.D., Interim Associate Dean—Undergraduate Education and Advising

Charlene Mattison, Assistant Dean—College Relations and Development

Donna Justice, Director—College Strategic Marketing and Communications

***Management, Graduate School of***

Ann Huff Stevens, Ph.D., Interim Dean

Kimberly D. Elsbach, Ph.D., Associate Dean

Brad M. Barber, Ph.D., Associate Dean

James T. Kelly, M.B.A., Assistant Dean

James Stevens, M.B.A., Assistant Dean

***Medicine, School of***

Julie Ann Freischlag, M.D., Vice Chancellor of Human Health Sciences and Dean

David Acosta, M.D., Associate Vice Chancellor for Equity, Diversity and Inclusion

Thomas Nesbitt, M.D., M.P.H., Associate Vice Chancellor for Strategic Technologies and Alliances

Heather Young, Ph.D., R.N., F.A.A.N., Associate Vice Chancellor for Nursing

Aaron Bair, M.D., M.S., Associate Dean for Continuing Medical Education

Lars Berglund, M.D., Ph.D., Senior Associate Dean for Clinical Research

William Cahill, M.D., Associate Dean for Veterans Affairs

Edward Callahan, Ph.D., Associate Dean for Academic Personnel

Ralph de Vere White, M.D., Associate Dean for Cancer Center

David H. Wisner, M.D., Associate Dean for Clinical Affairs and Director, Practice Management Board

Mark Henderson, M.D., Associate Dean for Admissions and Outreach

Lee Jones, M.D., Associate Dean for Student Affairs

Jana Katz-Bell, M.P.H., Assistant Dean for Interprofessional Education

Darin Latimore, M.D., Associate Dean for Student and Resident Diversity

James Nuovo, M.D., Associate Dean for Graduate Medical Education  
 Mark Servis, M.D., Senior Associate Dean for Curriculum and Competency Development  
 Frank Sousa, M.D., Assistant Dean for Admissions and Student Development  
 Ted Wun, M.D., Associate Dean for Research

**Nursing, Betty Irene Moore School of**

Heather M. Young, Ph.D., R.N., F.A.A.N., Associate Vice Chancellor for Nursing & Dean  
 Theresa A. Harvath, Ph.D., R.N., F.A.A.N., Associate Dean for Academics  
 Jill G. Joseph, M.D., Ph.D., M.P.H., Associate Dean for Research  
 Jana Katz-Bell, M.P.H., Assistant Dean for Interprofessional Programs  
 Emily Sanson-Smith, M.B.A., Assistant Dean for Administration  
 Sallie-Grace Tate, Assistant Dean for Advancement

**Veterinary Medicine, School of**

Michael D. Lairmore, D.V.M., Ph.D., Dean  
 John R. Pascoe, B.V.Sc., Ph.D., Executive Associate Dean  
 Patricia A. Conrad, D.V.M., Ph.D., Associate Dean—Global Programs  
 Jan E. Ilkiw, B.V.Sc., Ph.D., Associate Dean—Academic Programs  
 Sean Owens, D.V.M., Associate Dean—Admissions and Student Programs  
 Isaac Pessah, Ph.D., Associate Dean—Research and Graduate Education  
 Jane Sykes, B.V.Sc., Ph.D., Interim Associate Dean—Clinical Programs and Director—Veterinary Medical Teaching Hospital

**UC Davis Extension**

Paul M. McNeil, Ph.D., Dean  
 Rita Bunch, M.B.A., Assistant Dean, Chief Operating Officer

**UC Davis Health System Leadership; Medical Center, School of Medicine, Betty Irene Moore School of Nursing**

Claire Pomeroy, M.D., M.B.A., Vice Chancellor—Human Health Sciences and Dean  
 Heather Young, Ph.D., R.N., F.A.A.N., Associate Vice Chancellor—Nursing  
 Thomas S. Nesbitt, M.D., M.P.H., Associate Vice Chancellor—Strategic Technologies and Alliances  
 Ann Madden Rice, Chief Executive Officer—UC Davis Medical Center  
 Fred Meyers, M.D., M.A.C.P., Executive Associate Dean  
 Michael Minear, Chief Information Officer  
 Timothy Maurice, M.B.A., Chief Financial Officer  
 James Goodnight, M.D., Ph.D., Associate Dean—Clinical Affairs and Director—Practice Management Board  
 Shelton J. Duruisseau, Ph.D., Associate Vice Chancellor—Diversity and Inclusion and Chief External Affairs Officer  
 Anna Orlowski, J.D., Chief Legal Counsel  
 Teresa Porter, Chief Compliance Officer  
 Allan D. Sieffkin, M.D., Chief Medical Officer—UC Davis Medical Center  
 Vincent L. Johnson, Chief Operating Officer—UC Davis Medical Center  
 Carol Robinson, R.N., M.P.A., N.E.A.-B.C., F.A.A.N., Chief Nursing Officer and Chief Patient Care Services Officer—UC Davis Medical Center  
 J. Douglas Kirk, M.D., F.A.C.E.P., Associate Chief Medical Officer—UC Davis Medical Center

## CONTENTS

Academic Calendar	1	Center for Science and Innovation Studies	32
Welcome To UC Davis	5	Coastal and Marine Sciences Institute	32
Address Directory	6	Computer Security Laboratory	33
The Board of Regents	7	Genome Center	33
The Regents of the University of California	7	Health Sciences Research Laboratory—Animal Surgery	33
Ex Officio Regents	7	Human Performance Laboratory	33
Appointed Regents	7	Humanities Institute	33
Principal Officers of the Regents	7	Mann Laboratory	33
Administrative Officers of the University	7	Natural Reserve System	34
University Chancellors	8	Nuclear Magnetic Resonance Facility	34
Administrative Officers—UC Davis	8	UC Pavement Research Center	34
Degrees Offered by UC Davis	15	Social Science Data Service	34
Minor Programs Offered by UC Davis	17	Sustainable Transportation Energy Pathways (STEPS)	34
<b>Introduction 18</b>		Tahoe Environmental Research Center (TERC)	34
Introduction	19	UC Agricultural Issues Center	35
Advancing Knowledge	19	UC Davis Center for Plant Diversity	35
A Place for Discovery	19	UC Davis Energy Institute	35
Leader in Public Service	19	UC Davis J. Amorocho Hydraulics Laboratory (JAHL)	35
Life at UC Davis	19	X-Ray Crystallographic Laboratory	35
The University of California	20	Average Yearly Salary Offered to Graduates With Bachelor's, Master's, and Doctorate Degrees	36
Visiting the Campus	20	Proportion of UC Davis Graduates Finding Work in Their Fields of Choice	37
Accreditation	20	Retention Data and Graduation Rates at UC Davis	37
The Undergraduate Colleges	20	<b>Undergraduate Admissions 38</b>	
The College of Agricultural and Environmental Sciences	20	Undergraduate Admissions	39
Principles of Community	21	Applying to UC Davis	39
Educational Objectives for Students	22	Application Fees	39
Philosophy of Purpose	23	Admission as a Freshman	39
The College of Biological Sciences	24	UC Freshman Applicant Definition	39
The College of Engineering	24	UC Freshman Admission Requirements	39
The College of Letters and Science	25	UC Pathways for California Residents	40
Graduate Study	25	UC Freshman Admission Requirements for Out-of-State Applicants	40
Professional Study	26	Campus Selection vs. UC Admission Requirements	40
Academic Resources	26	Transfer Credit for College Courses	40
The University Library	26	Advanced Placement (AP) Examinations	40
UC Davis Arboretum and Public Garden	26	A Guide for Students with Advanced Placement (AP) Credit for a UC Davis Course	40
Information and Educational Technology	26	International Baccalaureate (IB) Examinations	40
Research Programs and Resources	27	Admission as a Transfer Student	49
Organized Research Units	27	UC Transfer Applicant Definition	49
Air Quality Research Center (AQRC)	27	Campus Selection and Priority	49
Bodega Marine Laboratory and Reserve	28	UC Transfer Admission Requirements for California Residents	49
California National Primate Research Center	28	Alternatives for Satisfying UC Transfer Admission Requirements	49
Center for Health and the Environment	28	UC Transfer Admission Requirements for Out-of-State Applicants	50
Crocker Nuclear Laboratory	28	Transfer Credit	50
Institute for Data Analysis and Visualization	28	Advanced Placement (AP) Examinations	50
Institute of Governmental Affairs	29	International Baccalaureate (IB) Examinations	50
Institute of Transportation Studies	29	Limited Status	50
John Muir Institute of the Environment	29	Second Baccalaureate	50
Nanomaterials in the Environment, Agriculture and Technology (NEAT)	29	UC Intercampus Transfer	50
Program in International and Community Nutrition	29	Admission as an International Student	50
Additional Research Centers and Resources	29	International Freshman Applicants	50
Adult Fitness Program	29	International Transfer Applicants	51
Advanced Highway Maintenance & Construction Technology (AHMCT) Research Center	30	Required International Academic Records	51
Advanced Materials Characterization and Testing Laboratory (AMCaT)	30	English Proficiency	51
Advanced Transportation Infrastructure Research Center Facility (ATIRC)	30	After You Apply for Admission	51
Agricultural Sustainability Institute	30	Required Academic Records for All Students	51
California Agricultural Experiment Station	30	Special Programs	52
Center for Advanced Laboratory Fusion Science and Engineering (CALFUSE)	30	Deferred Enrollment	52
Center for Biophotonics (C4B)	31	<b>Fees, Expenses and Financial Aid 53</b>	
Center for Child and Family Studies	31	Fees and Expenses	54
Center for Geotechnical Modeling	31	Course Materials and Services Fees	54
Center for Information Technology in the Interest of Society (CITRIS)	31	Part-Time Students	54
Center for Mind and Brain	31	UC Employee-Student Fees	54
Center for Molecular Genomic Imaging (CMGI)	31	Vehicle Parking Permit and Bicycle Licensing Fees	54
Center for Nano and Micromanufacturing	32	Costs for a Year at UC Davis	54
Center for Neuroscience	32	International Student Expenses	54
Center for Population Biology	32		

Fee Refunds	56
Cancellation, Withdrawal and Fee Refunds	56
Planned Educational Leave Program (PELP)	56
Schedule of Refunds	56
UC Davis Student Health Insurance Plan (Davis SHIP) Coverage and Refund of Davis SHIP Fees	56
Residence for Tuition Information	57
Policy Governing Residence	57
Office of the General Counsel	57
Nonresident Supplemental Tuition Fee for Nonresident Students	57
Resident Determination Process	57
Incorrect Classification	57
Appeals	57
Petitions for Classification to Resident Status	57
Inquiries	57
Financial Aid	58
UC Education Finance Policy for Undergraduates	58
Graduate Student Funding	58
Satisfactory Academic Progress	58
Types of Financial Aid	58
Work-Study	60
Undergraduate Scholarships and Awards	60
<b>Student Life</b>	<b>61</b>
Student Life	62
Living at Davis	62
On-Campus Housing	62
Off-Campus Housing	63
Transportation and Parking	63
Buses	64
Student Employment	64
WorkLife and Wellness	64
Health and Counseling Services	64
Student Health and Counseling Services (SHCS)	64
Student Health Insurance	65
SHCS Counseling Services	65
Mind Spa	66
Health Education and Promotion	66
Extracurricular Activities	66
Campus Recreation and Unions	66
The Department of Campus Recreation and Unions	66
Campus Recreation and Unions Memberships, Informal Recreation and Fitness & Wellness Programs	67
Cal Aggie Marching Band	67
Aquatics	67
Craft Center	67
Equestrian Programs	67
Intramural Sports and Sport Clubs	67
Memorial Union (MU)	67
Memorial Union Games Area	68
Outdoor Adventures	68
The Buzz	68
UC Davis Stores	68
Silo Union	68
The UC Davis Activities and Recreation Center (ARC)	68
UC Davis Intramural Sports and Sport Clubs	68
Intercollegiate Athletics	68
Arts	69
Robert and Margrit Mondavi Center for the Performing Arts   UC Davis	69
Music	69
Theatre and Dance	69
Art Galleries	69
Student Government	70
Associated Students (ASUCD)	70
UC Davis Administrative Advisory Committees	70
Graduate Student Association (GSA)	71
Center for Student Involvement (CSI)	71
Student Organizations	71
Involvement Fair	71
Sorority and Fraternity Life	71
Student Retention and Recruitment Center	71
Cal Aggie Student Alumni Association (SAA)	71

University Policy on Nondiscrimination, Sexual Harassment/Sexual Assault, Disability Accommodations, Student Records and Privacy	72
Campus Security, Crime Awareness, and Alcohol and Drug Abuse Prevention	73
<b>Academic Advising and Student Services</b>	<b>74</b>
Academic Advising	75
College Advising	75
College of Agricultural and Environmental Sciences	75
College of Biological Sciences	75
College of Engineering	75
College of Letters and Science	76
Academic Advising Services	77
Educational Opportunity Program (EOP)	77
Student Disability Center	77
Student Housing	77
Student Conduct and Grievances	77
Misconduct and Discipline	78
Student Responsibilities	78
Discrimination/Harassment	78
Resolving Academic Problems	78
Grade Changes	78
Other Academic Problems	78
ASUCD Student Advocacy Grievance Center	78
Student Academic Success Center	79
Academic Assistance and Tutoring	79
Educational Opportunity Program (EOP) Services	79
Guardian Scholars Program (GSP)	79
Mentorships for Undergraduate Research in Agriculture, Letters and Science (MURALS)	79
Transfer Reentry Veterans (TRV) Center	79
Pre-Graduate/Pre-Professional Services	79
Special Transitional Enrichment Program (STEP)	80
Study Skills Assistance	80
Internships and Career Services	80
Internship Programs	80
The Internship and Career Center (ICC)	80
Masters, Ph.D.s and Postdoc Services	80
Community Service Resource Center	80
Academic Resources	80
UC Davis Study Abroad	80
First-Year Seminar Program	81
Mathematics and Science Teaching Program (MAST)	81
Student Farm	81
Undergraduate Research Center	81
Washington Program	81
Student Resource and Information Centers	81
Center for Advocacy, Resources & Education (CARE)	81
Center for Leadership Learning	82
Cross-Cultural Center	82
Lesbian Gay Bisexual Transgender Queer Intersex Asexual Resource Center	82
Services for International Students and Scholars (SISS)	82
Women's Resources and Research Center (WRRC)	83
<b>Academic Information</b>	<b>84</b>
Registering at UC Davis	85
Registration	85
Late Registration	85
Enrolling in Courses	85
Adding and Dropping Courses	85
Late Add	85
Late Drop	85
Retroactive Drop	85
Retroactive Add	86
Course Load	86
Part-Time Student Status	86
The Major	86
Declaration of Major	86
Change of Major Within a College	87
Change of Major Accompanied by Change of College	87
Multiple Majors	87
Cross-College Majors	88
Individual Major	89

The Minor	89	<b>Graduate Studies</b>	<b>120</b>
Additional Requirements for Colleges	89	Graduate Studies	121
Requirements for Schools	89	Preparing for an Advanced Degree	121
Academic Credit	89	Applying for Admission	121
Units of Credit	89	About Admissions	121
Credit by Examination	90	Readmission	121
Concurrent Credit from Another Institution	90	International Students	122
Intercampus Visitor Program	90	Program of Study	122
Summer Sessions	90	Master's Degree	122
UC/CSU/Community College Cross Enrollment	91	Doctoral Degree	122
Open Campus (Concurrent) Program	91	Intercampus Exchange Program	123
UC Davis Extension	91	Fellowships, Assistantships and Loans	123
Examinations	91	Graduate Academic Certificate Program	123
Midterms	91	Graduate Certificate Program for Engineers	123
Final Examinations	91	Seminar On College Teaching	123
Grades	92	<b>School of Education</b>	<b>125</b>
Grade Points	92	School of Education	126
Grade Point Average (GPA)	92	Programs of Study	126
Passed/Not Passed (P/NP) Grading	92	Preparing for the Study of Education	127
Satisfactory/Unsatisfactory (S/U)	93	Teaching Credential/M.A. Degree Program	127
In-Progress (IP) Grading	93	Applying for Admission	127
Incomplete Grades	93	Minor in Education	127
Retroactive Grade Changes	94	Teaching Credential/M.A. Degree Program	127
Repeating Courses	94	M.A. Degree	128
Mid-Term Grade Standing	94	Capital Area North Doctorate in Educational Leadership	128
Final Grades	94	(CANDEL)	128
Transcripts	94	Ph.D. Degree	128
Probation and Dismissal	94	<b>School of Law</b>	<b>129</b>
Scholastic Deficiencies	94	School of Law	130
Dismissal	95	Preparing for the Study of Law	130
Honors and Prizes	96	Applying for Admission	130
Deans' Honors Lists	96	Admission to Advanced Standing	131
Graduation Honors	96	Recruitment of Underrepresented Groups	131
The Honors Program of the College of Letters and Science	96	Program of Study	131
The Honors Program of the College of Engineering	96	Combined Degree Programs	131
University Honors Program	96	The LL.M. Program	132
Prizes and Awards	97	School of Law Academic Calendar 2016-2017	132
Chancellor's Award for Excellence in Mentoring Undergraduate Research	97	<b>Graduate School of Management</b>	<b>133</b>
Honorary Societies	97	Graduate School of Management	134
Leaving UC Davis	97	Preparing for the Study of Management	134
Graduation	97	Applying for Admission	134
Leave of Absence: Planned Educational Leave Program (PELP)	98	International Students	134
Cancellation/Withdrawal	98	Criteria for Admission	134
Returning to UC Davis; Readmission	98	Program of Study	134
<b>Undergraduate Education</b>	<b>99</b>	Part-Time MBA Programs in Sacramento and Bay Area	135
Undergraduate Education	100	Master of Professional Accountancy (MPAc)	135
College of Agricultural and Environmental Sciences	100	<b>School of Medicine</b>	<b>137</b>
The Undergraduate Programs	100	School of Medicine	138
College of Biological Sciences	101	Preparing for the Study of Medicine	138
The Undergraduate Programs	101	Admissions Process	138
College-wide Programs	102	Admissions Criteria	138
College of Engineering	103	Transfer with Advanced Standing	139
The Undergraduate Programs	103	Program of Study	139
College of Letters and Science	105	Academic Calendar	139
The Undergraduate Programs	105	<b>Betty Irene Moore School of Nursing</b>	<b>140</b>
Bachelor's Degree Requirements	106	Betty Irene Moore School of Nursing at UC Davis	141
University Requirements	107	Programs of Study	141
Entry Level Writing Requirement	107	Nursing Science and Health-Care Leadership	141
American History and Institutions	108	Doctor of Philosophy	141
Unit Requirements	108	Master of Health Services—Physician Assistant Studies	141
Residence Requirements	108	Master of Science—Leadership	142
Scholarship Requirement	108	Master of Science—Nurse Practitioner	142
General Education Requirement	108	Master's Entry Program in Nursing	142
General Education (GE) Requirement—Fall 2011 and On	109	Master of Science—Nurse Practitioner and Physician Assistant Dual-Track Program	142
Former General Education (GE) Requirement—Pre-Fall 2011	110	Preparing for the Study of Nursing	143
General Education Theme Options	111	Applying for Admission	143
College Requirements for the Bachelor's Degree	111	Doctor of Philosophy	143
College of Agricultural and Environmental Sciences	111	Admission Requirements	143
College of Biological Sciences	113	Degree Program Requirements	143
College of Engineering	115		
College of Letters and Science	116		

Master of Health Services—Physician Assistant Studies Degree Program	143	Variable-Unit Courses	148
Admission Requirements	143	Graduate Courses	148
Degree Program Requirements	143	Professional Courses for Teachers and Nurse Practitioners	148
Master of Services—Leadership Degree Program	143	Other Professional Courses	148
Admission Requirements	143	Prerequisites	148
Degree Program Requirements	143	Course Descriptions	149
Master of Services—Nurse Practitioner Track Degree Program	144	Alternate Year Designation	149
Admission Requirements	144	Multi-Quarter Courses	149
Degree Program Requirements	144	Expanded Course Descriptions	149
Master of Science in Nursing: Master's Entry Program in Nursing	144	<b>General Education Options/Courses</b>	<b>592</b>
Admission Requirements	144	New General Education Courses; Fall 2011 and On	593
Degree Program Requirements	144	Former General Education Courses; Pre-Fall 2011	617
Master of Science—Nurse Practitioner and Physician Assistant Dual-track Program	144	Topical Breadth Assigned Subject Areas for Majors and Minors; Pre-Fall 2011	632
Academic Calendar	144	Arts & Humanities	632
<b>School of Veterinary Medicine</b>	<b>145</b>	Science & Engineering	632
School of Veterinary Medicine	146	Social Sciences	632
<b>Programs and Courses</b>	<b>147</b>	General Education Theme Options	633
Undergraduate Courses	148		
Lower Division Courses	148		
Upper Division Courses	148		
		<b>Index</b>	<b>634</b>
		<b>UC Davis Campus Facilities Map Legend</b>	<b>648</b>
		<b>UC Davis Campus Facilities Map</b>	<b>649</b>

## DEGREES OFFERED BY UC DAVIS

Undergraduate majors are administered by the colleges of Agricultural and Environmental Sciences (A&ES), Biological Sciences (CBS), Letters and Science (L&S), and Engineering. Professional studies are administered by the schools indicated. All graduate programs are administered by the Office of Graduate Studies. The list below indicates the major or discipline, the degree(s) offered and the school or college offering the major.

Degrees offered: A.B.–Bachelor of Arts, B.S.–Bachelor of Science, Certificate, Credential, M.A.–Master of Arts, M.A.S.–Master of Advanced Studies, M.B.A.–Master of Business Administration, M.Ed.–Master of Education, M.Engr–Master of Engineering, M.F.A.–Master of Fine Arts, M.H.S–Master of Health Services, M.P.H.–Master of Public Health, M.P.V.M.–Master of Preventive Veterinary Medicine, M.S.–Master of Science, M.S.N.–Master of Science in Nursing, Ed.D.–Doctorate in Education, D. Engr.–Doctor of Engineering, Ph.D.–Doctor of Philosophy, J.D.–Doctor of Jurisprudence, LL.M.–Master of Laws, M.D.–Doctor of Medicine, D.V.M.–Doctor of Veterinary Medicine. \* Admissions suspended Fall 2012. \*\* Master's degree offered only en route to Ph.D. \*\*\* Master's degree only offered under special circumstances. † Fall 2012 admissions closed to freshman applicants; open to transfer applicants; Fall 2013 admissions open to undergraduate applicants at all levels. §§ As of Fall 2014, the Exercise Biology A.B. and B.S. were closed to admissions and changes into the major.

### Aerospace Science and Engineering

B.S. .... Engineering

### African American and African Studies

A.B. .... L&S

### Agricultural and Environmental Chemistry

M.S., Ph.D. .... A&ES

### Agricultural and Resource Economics

M.S., M.S./M.B.A., Ph.D. .... A&ES

### Agricultural and Environmental Education

B.S. .... A&ES

### American Studies

A.B. .... L&S

### Animal Behavior

M.S.\*\*, Ph.D. .... CBS

### Animal Biology

B.S., M.S., Ph.D. .... A&ES

### Animal Science

B.S. .... A&ES

### Animal Science and Management

B.S. .... A&ES

### Anthropology

A.B. or B.S., M.A., Ph.D. .... L&S

### Applied Mathematics

B.S., M.S., Ph.D. .... L&S

### Applied Physics

B.S. .... L&S

### Art History

A.B., M.A. .... L&S

### Art Studio

A.B., M.F.A. .... L&S

### Asian American Studies

A.B. .... L&S

### Atmospheric Science

B.S., M.S., Ph.D. .... A&ES

### Avian Sciences

M.S. .... A&ES

### Biochemical Engineering

B.S. .... Engineering

### Biochemistry, Molecular, Cellular, and Developmental Biology

M.S., Ph.D. .... CBS

### Biochemistry and Molecular Biology

B.S. .... CBS

### Biological Sciences

A.B. or B.S. .... CBS

### Biological Systems Engineering

B.S., M.S., M.Engr., Ph.D., D.Engr. .... Engineering

### Biomedical Engineering

B.S., M.S., Ph.D. .... Engineering

### Biophysics

M.S.\*\*, Ph.D. .... CBS

### Biostatistics

M.S., Ph.D. .... L & S

### Biotechnology

B.S. .... A&ES

### Business Administration

M.B.A. .... Graduate School of Management

### Cell Biology

B.S. .... CBS

### Chemical Engineering

B.S., M.S., Ph.D. .... Engineering

### Chemical Physics

B.S. .... L&S

### Chemistry

A.B. or B.S., M.S.\*\*, Ph.D. .... L&S

### Chicana/Chicano Studies

A.B. .... L&S

### Child Development

M.S. .... A&ES

### Chinese

A.B. .... L&S

### Cinema and Digital Media

A.B. .... L&S

### Civil and Environmental Engineering

M.S., Ph.D., Certificate .... Engineering

### Civil Engineering

B.S. .... Engineering

### Classical Civilization

A.B. .... L&S

### Clinical Nutrition

B.S. .... A&ES

### Clinical Research

M.A.S. .... School of Medicine

### Cognitive Science

A.B., B.S. .... L&S

### Communication

A.B., M.A., Ph.D. .... L&S

### Community and Regional Development

B.S. .... A&ES

### Community Development

M.S. .... A&ES

### Comparative Literature

A.B., M.A., Ph.D. .... L&S

### Computer Engineering

B.S.† .... Engineering

### Computer Science

B.S. .... L&S

### Computer Science

M.S., Ph.D. .... Engineering

### Computer Science and Engineering

B.S. .... Engineering

### Conservation Management

Certificate .... Graduate Studies

### Cultural Studies

M.A.\*\*, Ph.D. .... L&S

### Design

A.B., M.F.A. .... L&S

### Dramatic Art

M.F.A. .... L&S

### East Asian Studies

A.B. .... L&S

### Ecological Management and Restoration

B.S. .... A&ES

### Ecology

M.S., Ph.D. .... A&ES

### Ecology (Joint Doctorate with San Diego State University)

Ph.D. .... A&ES

### Economics

A.B., M.A.\*\*, Ph.D. .... L&S

### Education

M.A., Ph.D., Ed.D., Credential ... School of Education

### Electrical and Computer Engineering

B.S./M.S., M.S., Ph.D. .... Engineering

### Electrical Engineering

B.S.† .... Engineering

### English

A.B., M.A., Ph.D. .... L&S

### Entomology

M.S., Ph.D. .... A&ES

### Entomology and Nematology

B.S., M.S., Ph.D. .... A&ES

### Environmental Horticulture and Urban Forestry

B.S. .... A&ES

### Environmental Policy Analysis and Planning

B.S. .... A&ES

### Environmental Science and Management

B.S. .... A&ES

### Environmental Toxicology

B.S. .... A&ES

### Epidemiology

M.S., Ph.D. .... School of Veterinary Medicine

<b>Evolution, Ecology, and Biodiversity</b>	B.S. or B.S. .... CBS	<b>Managerial Economics</b>	B.S. .... A&ES	<b>Philosophy</b>	A.B., M.A.**, Ph.D. .... L&S
<b>Exercise Biology**</b>	A.B. or B.S. .... CBS	<b>Marine and Coastal Science</b>	B.S. .... A&ES, CBS, L&S	<b>Physics</b>	A.B. or B.S., M.S., Ph.D. .... L&S
<b>Fiber and Polymer Science</b>	B.S. .... A&ES	<b>Master of Professional Accountancy</b>	M.P.Ac. .... Graduate School of Management	<b>Plant Biology</b>	A.B. or B.S., M.S., Ph.D. .... CBS
<b>Food Science</b>	B.S., M.S., Ph.D. .... A&ES	<b>Master of Public Health</b>	M.P.H. .... School of Medicine	<b>Plant Sciences</b>	B.S. .... A&ES
<b>Forensic Science</b>	M.S. .... Graduate Studies	<b>Materials Science and Engineering</b>	B.S., M.S., M.Engr., Ph.D. .... Engineering	<b>Political Science</b>	A.B., M.A.**, Ph.D. .... L&S
<b>French</b>	A.B., M.A., Ph.D. .... L&S	<b>Maternal and Child Nutrition</b>	M.A.S. .... A&ES	<b>Political Science—Public Service</b>	A.B. .... L&S
<b>Gender, Sexuality &amp; Women's Studies</b>	A.B. .... L&S	<b>Mathematical Analytics and Operations Research</b>	B.S. .... L&S	<b>Population Biology</b>	M.S.**, Ph.D. .... CBS
<b>Genetics and Genomics</b>	B.S. .... CBS	<b>Mathematical and Scientific Computation</b>	B.S. .... L&S	<b>Preventive Veterinary Medicine</b>	M.P.V.M. .... School of Veterinary Medicine
<b>Geography</b>	M.A., Ph.D. .... A&ES	<b>Mathematics</b>	A.B. or B.S., M.A., Ph.D. .... L&S	<b>Psychology</b>	A.B. or B.S., M.A.**, Ph.D. .... L&S
<b>Geology</b>	A.B. or B.S., M.S., Ph.D. .... L&S	<b>Mechanical and Aerospace Engineering</b>	M.S., Ph.D. .... Engineering	<b>Religious Studies</b>	A.B. .... L&S
<b>German</b>	M.A., Ph.D. .... L&S	<b>Mechanical Engineering</b>	B.S.† .... Engineering	<b>Russian</b>	A.B. .... L&S
<b>Global Disease Biology</b>	B.S. .... A&ES	<b>Medicine</b>	M.D. .... School of Medicine	<b>Science and Technology Studies</b>	A.B. .... L&S
<b>Health Informatics</b>	M.S. .... School of Medicine	<b>Medieval and Early Modern Studies</b>	A.B. .... L&S	<b>Second Language Acquisition</b>	Certificate .... Graduate Studies
<b>History</b>	A.B., M.A.**, Ph.D. .... L&S	<b>Microbiology</b>	M.S.**, Ph.D. .... School of Medicine	<b>Sociology</b>	A.B., M.A.**, Ph.D. .... L&S
<b>Horticulture and Agronomy</b>	M.S., Ph.D. .... A&ES	<b>Microbiology and Molecular Genetics</b>	A.B. or B.S. .... CBS	<b>Sociology—Organizational Studies</b>	A.B. .... L&S
<b>Human Development</b>	B.S., Ph.D. .... A&ES	<b>Middle East/South Asia Studies</b>	A.B. .... L&S	<b>Soils and Biogeochemistry</b>	M.S., Ph.D. .... A&ES
<b>Hydrologic Sciences</b>	M.S., Ph.D. .... A&ES	<b>Molecular, Cellular, and Integrative Physiology</b>	M.S., Ph.D. .... CBS	<b>Spanish</b>	A.B., M.A., Ph.D. .... L&S
<b>Hydrology</b>	B.S. .... A&ES	<b>Music</b>	M.S., Ph.D. .... L&S	<b>Statistics</b>	A.B. or B.S., B.S./M.S., M.S., Ph.D. .... L&S
<b>Immunology</b>	M.S., Ph.D. .... School of Veterinary Medicine	<b>Native American Studies</b>	A.B., M.A., Ph.D. .... L&S	<b>Study of Religion</b>	M.A., Ph.D. .... L&S
<b>Individual Major</b>	A.B., B.S. .... CBS or L&S	<b>Natural Sciences</b>	B.S. .... L&S	<b>Sustainable Agriculture and Food Systems</b>	B.S. .... A&ES
<b>Integrative Genetics and Genomics</b>	M.S., Ph.D. .... CBS	<b>Neurobiology, Physiology, and Behavior</b>	B.S. .... CBS	<b>Sustainable Environmental Design</b>	B.S. .... A&ES
<b>Integrative Pathobiology</b>	M.S., Ph.D. .... School of Veterinary Medicine	<b>Neuroscience</b>	M.S.**, Ph.D. .... CBS	<b>Textiles</b>	M.S. .... A&ES
<b>International Commercial Law</b>	LL.M. .... School of Law	<b>Nursing Science and Health-Care Leadership</b>	M.H.S., M.S., M.S.N., Ph.D. .... Betty Irene Moore School of Nursing	<b>Textiles and Clothing</b>	B.S. .... A&ES
<b>International Agricultural Development</b>	M.S. .... A&ES	<b>Nutrition Science</b>	B.S. .... A&ES	<b>Theatre and Dance</b>	B.S. .... A&ES
<b>International Relations</b>	A.B. .... L&S	<b>Nutritional Biology</b>	M.S., Ph.D. .... A&ES	<b>Transportation Technology and Policy</b>	A.B. .... L&S
<b>Italian</b>	A.B. .... L&S	<b>Performance Studies</b>	M.A.**, Ph.D. .... L&S	<b>Veterinary Medicine</b>	M.S., Ph.D. .... Engineering
<b>Japanese</b>	A.B. .... L&S	<b>Pharmaceutical Chemistry</b>	B.S., M.S. .... L&S	<b>Viticulture and Enology</b>	D.V.M. .... School of Veterinary Medicine
<b>Landscape Architecture</b>	B.S. .... A&ES	<b>Pharmacology and Toxicology</b>	M.S., Ph.D. .... A&ES, School of Veterinary Medicine	<b>Wildlife, Fish, and Conservation Biology</b>	B.S. .... A&ES
<b>Law</b>	J.D., LL.M. .... School of Law				
<b>Linguistics</b>	A.B., M.A., Ph.D. .... L&S				

## MINOR PROGRAMS OFFERED BY UC DAVIS

Minor programs are offered by the Colleges of Agricultural and Environmental Sciences (A&ES), Biological Sciences (CBS), Engineering (ENGR), and Letters and Science (L&S). The School of Education (SOE) and the Graduate School of Management (GSM) each offer one undergraduate minor. The list below indicates the minor program, the offering department (if the department name is different than the name of the minor) and the college offering the minor.

African American and African Studies . . . . .	L&S	Environmental Geology (Geology) . . . . .	L&S	Linguistics for Language Teachers . . . . .	L&S
Aging and Adult Development (Human & Community Development) . . . . .	A&ES	Environmental Horticulture (Plant Sciences) . . . . .	A&ES	Luso-Brazilian Studies (Spanish and Portuguese) . . . . .	L&S
Agricultural Pest Management . . . . .	A&ES	Environmental Policy Analysis & Planning (Environmental Science and Policy) . . . . .	A&ES	Managerial Economics (Agricultural and Resource Economics) . . . . .	A&ES
Agricultural Systems and Environment (Plant Sciences) . . . . .	A&ES	Environmental Toxicology . . . . .	A&ES	Materials Science (Materials Science and Engineering) . . . . .	ENGR
American Studies . . . . .	L&S	Evolution, Ecology and Biodiversity . . . . .	CBS	Mathematics . . . . .	L&S
Animal Science—Animal Biology . . . . .	A&ES	Exercise Biology (Neurobiology, Physiology, and Behavior) . . . . .	CBS	Medical-Veterinary Entomology (Entomology) . . . . .	A&ES
Animal Science—Animal Genetics . . . . .	A&ES	Fiber and Polymer Science (Textiles and Clothing) . . . . .	A&ES	Medieval and Early Modern Studies . . . . .	L&S
Animal Science—Aquaculture . . . . .	A&ES	Film Studies . . . . .	L&S	Middle East/South Asia Studies . . . . .	L&S
Animal Science—Dairy/Livestock . . . . .	A&ES	Food Service Management (Nutrition) . . . . .	A&ES	Music . . . . .	L&S
Animal Science—Equine . . . . .	A&ES	Forensic Entomology (Entomology) . . . . .	A&ES	Native American Studies . . . . .	L&S
Anthropology . . . . .	L&S	French . . . . .	L&S	Nematology . . . . .	A&ES
Applied Computing & Information Systems (Plant Sciences) . . . . .	A&ES	Fungal Biology and Ecology (Plant Pathology) . . . . .	A&ES	Neuroscience (Neurobiology, Physiology, and Behavior) . . . . .	CBS
Arab Studies . . . . .	L&S	Geographic Information Systems (Biological & Agricultural Engineering) . . . . .	A&ES	Nutrition and Food (Nutrition) . . . . .	A&ES
Art History . . . . .	L&S	Geographic Studies (Environmental Design) . . . . .	A&ES	Nutrition Science (Nutrition) . . . . .	A&ES
Art Studio . . . . .	L&S	Geology . . . . .	L&S	Oceanography (Geology) . . . . .	L&S
Asian American Studies . . . . .	L&S	Geophysics (Geology) . . . . .	L&S	Philosophy . . . . .	L&S
Atmospheric Science (Land, Air, and Water Resources) . . . . .	A&ES	German . . . . .	L&S	Physics . . . . .	L&S
Avian Sciences (Animal Science) . . . . .	A&ES	Global and International Studies (Humanities) . . . . .	L&S	Plant Biology . . . . .	CBS
Biological Sciences . . . . .	CBS	Global Disease Biology . . . . .	A&ES	Political Science . . . . .	L&S
Biomedical Engineering . . . . .	ENGR	Greek (Classics) . . . . .	L&S	Precision Agriculture (Biological and Agricultural Engineering) . . . . .	A&ES
Chemistry . . . . .	L&S	History . . . . .	L&S	Professional Writing (University Writing Program) . . . . .	L&S
Chicana/Chicano Studies . . . . .	L&S	History and Philosophy of Science (Science & Technology Studies) . . . . .	L&S	Psychology . . . . .	L&S
Chinese (East Asian Languages and Cultures) . . . . .	L&S	Human Development (Human & Community Development) . . . . .	A&ES	Quantitative Biology and Bioinformatics (Biological Sciences) . . . . .	CBS
Classical Civilization (Classics) . . . . .	L&S	Human Physiology (Neurobiology, Physiology, and Behavior) . . . . .	CBS	Religious Studies . . . . .	L&S
Coaching Principles and Methods . . . . .	L&S	Human Rights (Religious Studies) . . . . .	L&S	Russian . . . . .	L&S
Communication . . . . .	L&S	Hydrology (Land, Air, and Water Resources) . . . . .	A&ES	Science and Society . . . . .	A&ES
Community Development (Human & Community Development) . . . . .	A&ES	India and South Asia Studies . . . . .	L&S	Sexuality Studies . . . . .	L&S
Community Nutrition (Nutrition) . . . . .	A&ES	Insect Biology (Entomology) . . . . .	A&ES	Social and Ethnic Relations (African American and African Studies, Asian American Studies, Native American Studies, Women and Gender Studies) . . . . .	L&S
Comparative Literature . . . . .	L&S	Insect Ecology and Evolution (Entomology) . . . . .	A&ES	Sociology . . . . .	L&S
Computational Biology (Computer Science) . . . . .	ENGR	International Agricultural Development (Human & Community Development) . . . . .	A&ES	Soil Science (Land, Air, and Water Resources) . . . . .	A&ES
Computer Science . . . . .	L&S	International Science Studies (Land, Air, and Water Resources) . . . . .	A&ES	Spanish . . . . .	L&S
Construction Engineering and Management (Civil and Environmental Engineering) . . . . .	ENGR	Iran and Persian Studies . . . . .	L&S	Statistics . . . . .	L&S
Contemporary Leadership . . . . .	A&ES	Italian . . . . .	L&S	Sustainability in the Built Environment (Civil and Environmental Engineering) . . . . .	ENGR
Dramatic Art (Theatre and Dance) . . . . .	L&S	Japanese (East Asian Languages and Cultures) . . . . .	L&S	Technology Management . . . . .	GSM
East Asian Studies . . . . .	L&S	Jewish Studies (Humanities) . . . . .	L&S	Textiles and Clothing . . . . .	A&ES
Economics . . . . .	L&S	Landscape Restoration (Plant Sciences) . . . . .	A&ES	War-Peace Studies (International Relations) . . . . .	L&S
Education . . . . .	SOE	Latin (Classics) . . . . .	L&S	Watershed Science (Land, Air, and Water Resources) . . . . .	A&ES
Electrical Engineering (Electrical and Computer Engineering) . . . . .	ENGR	Latin American and Hemispheric Studies . . . . .	L&S	Wildlife, Fish and Conservation Biology . . . . .	A&ES
Energy Efficiency (Biological and Agricultural Engineering) . . . . .	ENGR	Linguistics . . . . .	L&S	Gender, Sexuality and Women's Studies . . . . .	L&S
Energy Science & Technology (Biological and Agricultural Engineering) . . . . .	ENGR				
Energy Policy (Biological and Agricultural Engineering) . . . . .	ENGR				
English . . . . .	L&S				



## INTRODUCTION

## INTRODUCTION

As one of the world's leading institutions of higher education, the University of California at Davis is committed to serving a student population as diverse as society at large through the advancement of knowledge and discovery.

Founded as the University Farm in 1905, UC Davis has grown from an agricultural college into a comprehensive research university. It was formally designated an independent UC campus in 1959.

In 2016, *U.S. News & World Report* ranked UC Davis eleventh among public universities nationally, and the campus is among only 62 universities admitted into the prestigious Association of American Universities.

UC Davis is home to a diverse student body of more than 34,000 students from across California, the nation and the world.

### Advancing Knowledge

UC Davis offers 104 undergraduate majors and 96 graduate and professional degrees across four colleges and six professional schools. In 2010, the National Research Council ranked one third of UC Davis' 51 doctoral programs in the top 25 percent of their fields, with six of them placing in the top 5 percent.

In the QS World University Rankings for 2016, UC Davis held its standing as the world's best university for veterinary medicine and came out among the top two universities in agriculture and forestry for the fourth consecutive year.

The campus' reputation has attracted a distinguished faculty of scholars and scientists. Faculty honors include 8 U.S. Presidential Awards, more than 280 National Academy memberships, 52 Fulbright Scholars and two Pulitzer Prizes.

### A Place for Discovery

UC Davis researchers work toward solving the world's most difficult problems and support California's economic, intellectual and social development. Over the past decade, annual research funding increased by 45 percent, from \$542 million to \$786 million.

Researchers explore the intellectual frontiers across the sciences, humanities and arts, with exceptional global leadership in agricultural science, food science and environmental sustainability.

Research is integral to teaching at UC Davis. Faculty members share their research findings in the classroom, and students learn first-hand about discovery while working with professors in the laboratory and field. Several undergraduate research programs offer students the opportunity to work on a research project in a faculty laboratory, in some cases as early as their freshman year.

### Leader in Public Service

In the tradition of land-grant universities, UC Davis uses knowledge and discovery in addressing the needs of the region, state, nation and world.

The UC Davis Health System serves 6 million people in 33 counties across northern and central California. It operates the Sacramento Valley's only Level 1 trauma center as well as a National Cancer Institute-designated cancer center, a comprehensive children's hospital and a world-renowned telemedicine network.

The School of Veterinary Medicine is involved in more than 30 nations, and its teaching hospital cares for more than 51,000 small and large animals each year. The School of Law offers community support in immigration, prison law, civil rights litigation and family protection.

The School of Education has prepared nearly 6,000 teachers for California classrooms since its inception in 2002.

The Betty Irene Moore School of Nursing, founded in 2009, is dedicated to improving patient safety and creating inter-professional opportunities for nurse leaders.

### Life at UC Davis

Students enjoy sports, community internships, public service, outdoor activities, concerts and clubs.

UC Davis is known for its student-run services. The Coffee House (CoHo), the radio station KDVS, Outdoor Adventures and the Unitrans bus service provide paying jobs to hundreds of students each year. Some 70 percent of UC Davis students gain work experiences through the Internship and Career Center, one of the largest programs of its kind in the nation.

The Robert and Margrit Mondavi Center for the Performing Arts features internationally renowned artists and speakers and showcases students' music, theater and dance performances.

Museums and galleries range from the Bohart Museum of Entomology's insects to contemporary Native American art at the C.N. Gorman Museum. The university will soon showcase its art collections in the Jan Shrem and Maria Manetti Shrem Art Museum, which is scheduled to open in November 2016.

In 2007, UC Davis transitioned to Division I of the National Collegiate Athletic Association. The university sponsors 13 varsity sports for women and 9 for men. The campus also fields nearly 40 student-organized intercollegiate sports clubs that compete against area colleges. Thousands of students also have fun playing with fellow Aggies in more than 30 men's, women's and coed sports, from flag football to ultimate Frisbee.

A city of more than 65,000 people, Davis is known as an environmentally aware, physically fit and socially innovative community. Davis has more bike-community residents per person than any other city in the U.S., with more than 100 miles of dedicated bike lanes and paths. Davis' proximity to the state capital and the San Francisco Bay Area make it easy to take advantage of big-city attractions while enjoying the lifestyle of a university town.

## THE UNIVERSITY OF CALIFORNIA

UC Davis is one of 10 campuses of the University of California, which was chartered as a land grant college in 1868 and has become the country's premier system of public higher education. Together, the campuses have an enrollment of more than 240,000 students and more than 1.7 million alumni living around the world. Some 150 laboratories, extension centers, research and field stations strengthen teaching and research while providing public service to California and the nation. The collections of the more than 100 UC campus libraries are surpassed in size in the U.S. only by that of the Library of Congress.

## VISITING THE CAMPUS

UC Davis Welcome Center  
530-752-8111; <http://visit.ucdavis.edu/>

Welcome Center operating hours are 8:00 a.m.-5:00 p.m. (PT), Monday-Friday and 9:00 a.m.-3:00 p.m. (PT) Saturday. Closed Sunday except for March 15-April 30. Monday-Friday campus tours are offered at 9:00 a.m. and 1 p.m. (PT) Saturday (and Sunday from March 15-April 30) tours are offered at 11:00 a.m. (PT). Over-the-counter admissions advising is offered during operating hours at the Welcome Center. To register for a tour, see <http://visit.ucdavis.edu> or call 530-752-8111. If you have questions regarding application procedures or entrance requirements, write or visit the UC Davis Welcome Center at 550 Alumni Lane, Davis, CA 95616.

## ACCREDITATION

The University of California, Davis is accredited by WASC Senior College and University Commission (WSCUC), 985 Atlantic Avenue, Suite 100, Alameda, CA 94501 510-748-9001, a regional institutional accrediting body recognized by the Council for Higher Education and the U.S. Department of Education.

UC Davis is also accredited by the Accreditation Board for Engineering and Technology, Accreditation Council for Graduate Medical Education, Accreditation Review Commission on Education for the Physician Assistant (ARC-PA), American Association for Accreditation of Laboratory Animal Care, American Bar Association, American Chemical Society, American Dietetic Association, American Psychological Association, American Society of Crime Lab Directors Laboratory Accreditation Board (ASCLD/LAB); American Society of Landscape Architects, Association of American Law Schools, Association of American Medical Colleges, Association to Advance Collegiate Schools of Business, Commission on Collegiate Nursing Education; Commission on Teacher Credentialing, Computer Science Accreditation Commission, Council on Education and Public Health, the Council on Education of the American Veterinary Medical Association, Intersocietal Commission for the Accreditation of Vascular Laboratories (ICAVL), and the Liaison Committee on Medical Education.

Students interested in reviewing WSCUC accreditation documents may do so at <http://wasc.ucdavis.edu>. Those interested in reviewing profession-specific accreditation documents should contact the relevant dean's office.

## THE UNDERGRADUATE COLLEGES

### The College of Agricultural and Environmental Sciences

College Office  
150 Mrak Hall  
530-752-0108; <http://www.caes.ucdavis.edu>

The College of Agricultural and Environmental Sciences offers a diverse program of majors and courses and is committed to education that emphasizes a spirit of discovery. Based on the premise that tomorrow's citizens will need to anticipate, understand and solve emerging societal problems and contribute to the discovery and application of new knowledge, the college fosters:

- Critical thinking and an appreciation for diversity in thought and approaches to problem solving
- An ethos of lifelong learning—of teaching oneself and others while confronting challenges and solving problems
- An ability to move beyond either/or thinking and to pursue innovative and integrative understanding of the agricultural sciences, environmental sciences and human sciences
- Intellectual skills that prepare individuals to secure a life-affirming physical and cultural environment based on sound, respectful management of resources
- A commitment to serve the public with informed and open-minded dedication to understanding, critiquing and addressing complex societal needs and interests

The college is proud of its rich agricultural history. From this foundation, it has expanded its educational offerings to encompass programs that highlight interconnections among the environment, plant and animal sciences, biological sciences and human sciences. Through a wide array of major programs, the college prepares high-potential students for advanced studies in diverse disciplines and leadership in such arenas as public policy; research and development; managerial and natural resource economics; agricultural systems; environmental protection, safety and design; human nutrition, health and development; and the food, fiber, textile and apparel industries.

Undergraduate students enjoy early contact with faculty advisers, graduate students and postgraduate researchers, enriching and broadening the educational experience of all.

Several levels of academic advising are available that are designed to enhance your undergraduate experience. Advisers help you plan your courses, meet degree requirements and take maximum advantage of the resources available at UC Davis. You are encouraged to meet regularly with your assigned faculty adviser and with the Advising Associates and departmental peer advisers. Through a shared commitment to education for service to society, college faculty, staff and students work together to improve the relationship between humanity and the natural world.

## University of California, Davis Principles of Community

**T**HE UNIVERSITY OF CALIFORNIA, DAVIS, is first and foremost an institution of learning and teaching, committed to serving the needs of society. Our campus community reflects and is a part of a society comprising all races, creeds, and social circumstances. The successful conduct of the University's affairs requires that every member of the University community acknowledge and practice the following basic principles:

**W**E AFFIRM THE DIGNITY inherent in all of us, and we strive to maintain a climate of justice marked by respect for each other. We acknowledge that our society carries within it historical and deep-rooted misunderstandings and biases, and therefore we will endeavor to foster mutual understanding among the many parts of our whole.

**W**E AFFIRM THE RIGHT of freedom of expression within our community and also affirm our commitment to the highest standards of civility and decency towards all. We recognize the right of every individual to think and speak as dictated by personal belief, to express any idea, and to disagree with or counter another's point of view, limited only by University regulations governing time, place, and manner. We promote open expression of our individuality and our diversity within the bounds of courtesy, sensitivity, and respect.

**W**E CONFRONT AND REJECT all manifestations of discrimination, including those based on race, ethnicity, gender, age, disability, sexual orientation, religious or political beliefs, status within or outside the University, or any of the other differences among people which have been excuses for misunderstanding, dissension, or hatred. We recognize and cherish the richness contributed to our lives by our diversity. We take pride in our various achievements, and we celebrate our differences.

**W**E RECOGNIZE that each of us has an obligation to the community of which we have chosen to be a part. We will strive to build a true community of spirit and purpose based on mutual respect and caring.

The "Principles of Community" were prepared and adopted after extensive discussion within the campus community about the need for a statement that reflects UC Davis' commitment to a learning environment characterized by diversity, understanding and the acceptance of all people. This statement of common principles was published on April 20, 1990, carrying the endorsement of Chancellor Theodore L. Hullar and the leadership of the Davis Division of the Academic Senate, the Academic Staff Organization, the UC Davis Staff Assembly, the UC Davis Medical Center Staff Assembly, the Associated Students of UC Davis (ASUCD), and the Graduate Student Association.



## Educational Objectives for Students

The UC Davis Educational Objectives for Undergraduate Students were adopted by the Academic Senate in April 2002 to:

- Articulate what we aspire for student learning.
- Help to establish campus priorities and guide decision making related to student development.
- Guide academic programs in the review of how their classes and course requirements interact with the goals to demonstrate educational effectiveness.

The objectives for undergraduate education at UC Davis are that all students

- Develop effective communication skills:  
Written, oral, interpersonal, group.
- Develop higher cognitive skills:  
Critical thinking, creativity, analytical ability.
- Cultivate the virtues:  
Ethics, responsibility, honor, tolerance, respect for others, empathy.
- Develop focus and depth in one or more disciplines.
- Develop leadership skills:  
Ability to stimulate and direct collaborative learning and collaborative action.
- Develop a global perspective:  
Broad intellectual and cultural experience through active engagement, an understanding of the interactions among the individual, society, and the natural world.
- Prepare for lifelong learning:  
Independent thinking and learning, learning to find information, asking the right questions.

**Mission Statement:**

# Philosophy of Purpose

The core purpose of UC Davis as a comprehensive research university is the generation, advancement, dissemination and application of knowledge. To that end, UC Davis is committed to offering leading programs throughout the academic disciplines and in its professional schools. These programs integrate three purposes: teaching students as a partnership between faculty mentors and young scholars; advancing knowledge and pioneering studies through creative research and scholarship; and applying that knowledge to address the needs of the region, state, nation and globe. UC Davis is committed to the land-grant tradition on which it was founded, which holds that the broad purpose of a university is service to people and society.

UC Davis offers its undergraduates an experience which comprises the central elements of a liberal education—a broad general education with specialization in a scholarly discipline—and opportunities for personal development and academic enrichment through undergraduate research, work-learn experiences and extracurricular student life. To its post-baccalaureate students, UC Davis offers an array of programs which draw upon its wide range of specialized academic fields. By stimulating cross-disciplinary approaches and using its distinctive graduate groups, UC Davis continues to follow and redefine the mandate of a major research university.

The campus is committed to advancing teaching and scholarly work in the arts, humanities and the social sciences – studies that enrich the life of each person and society as a whole, and infuse the pursuit of careers in education, law, management and medicine. UC Davis' prominence in the STEM fields, including distinguished programs in agricultural and environmental sciences, make the campus a leader in solving critical issues in local, state, national and global health and sustainability.

UC Davis extends service to the region, state, nation and the world in many forms, such as cooperative extension to agriculture and education; medical services to central California and beyond through the multifaceted UC Davis Health System in Sacramento; University Extension programs that share knowledge with the region; the emerging work of the World Food Center; voluntary contributions of faculty, staff and students; and athletic and cultural programs for the campus and community at large.

UC Davis is surrounded by vibrant, local communities and its proximity to the state capital gives this outreach urgency and opportunity. Collaborative studies and cooperation between UC Davis and state agencies and the Legislature are both a special responsibility and a unique opportunity. UC Davis is characterized by a distinguished faculty, a dedicated and high-achieving staff and students of great potential and accomplishment. As we move forward, we recognize that our continued excellence is dependent upon our ability to diversify our university community, consonant with the citizenry of California.

## The College of Biological Sciences

Biology Academic Success Center  
1023 Sciences Laboratory Building  
530-752-0410; <http://basc.ucdavis.edu>

The mission of the College of Biological Sciences is to prepare students to fully engage and actively participate in all areas of the exciting and rapidly expanding field of biology. Courses offered by the college span the basic biological disciplines of biochemistry, behavior, cell biology, evolution, ecology, genetics, physiology and neurobiology and apply these concepts to the study of microbes, plants and animals ranging from genetic model organisms to humans. Recent additions to the curriculum, including courses in genomics, bioinformatics and computational biology, reflect the profound changes sweeping biology as new technologies enable new areas of research.

Coursework in the college's majors is rich in hands-on laboratory instruction as well as lectures and seminars. Every department in the College offers laboratory courses in the Sciences Laboratory Building—a state-of-the-art facility featuring advanced instrumentation and a student-friendly environment. In addition, many students in the college participate in laboratory research and internships that enable them to bridge classroom experiences to life beyond the university.

Biology is integral to a multitude of career options. Whether interested in a professional career in the health sciences, research, education, environmental work, business, law, administration, pharmaceutical sales or communications, students in the College of Biological Sciences receive the attention and preparation they need to excel in their chosen field.

To learn more about the nine majors offered through the College of Biological Sciences, see <http://basc.ucdavis.edu>, select *Students*, then *Current Students*, and then select *Learn about the majors offered*.

## The College of Engineering

Dean's Office  
1042 Kemper Hall  
530-752-7642;  
<http://engineering.ucdavis.edu>  
<http://www.facebook.com/UCDEngineering>

The College of Engineering at UC Davis is among the top engineering colleges in the nation.

With a strong record of academic excellence, a rich tradition of interdisciplinary research and a diverse and distinguished faculty, the College's undergraduate program has earned a place among our nation's top twenty public undergraduate colleges of engineering and among the top twenty public university graduate engineering programs.

With an enrollment of 4,445 undergraduates and 1,005 graduate students, the College is one of the largest undergraduate engineering colleges in the University of California system.

We have 206 engineering faculty, with 21 current and emeriti members named to the National Academies of Engineering, Science and Medicine.

The Engineering Accreditation Commission of ABET (<http://www.abet.org>) accredits the following ten programs:

- Aerospace Science and Engineering
- Biochemical Engineering

- Biological Systems Engineering
- Biomedical Engineering
- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Electrical Engineering
- Materials Science and Engineering
- Mechanical Engineering

The Engineering Accreditation Commission and the Computing Accreditation Commission of ABET accredit the following program:

- Computer Science and Engineering

The College maintains a long-standing commitment to undergraduate students, preparing them to contribute to the engineering professions as well as ongoing engineering research. To that end, our academic programs balance the fundamentals of engineering theory with practice, visionary research with practical application—preparing students for entry into engineering practice and graduate-level research.

Undergraduate research experiences and mentoring services smooth the transition from undergraduate to graduate study at UC Davis. Undergraduates are able to interact with faculty and graduate students from nine graduate engineering programs as well as researchers from a broad spectrum of disciplines university-wide. Award-winning faculty researchers strive to develop more effective, real world solutions to society's most complex problems in the uniquely friendly, open society of collaborative, cross-disciplinary and rigorous scholarship for which UC Davis is widely known. Undergraduates have opportunities to be contributing members of this rich learning environment.

In the proud tradition of America's great land-grant research universities, the UC Davis College of Engineering integrates teaching, research and service to society. While advancing the leading edge of engineering knowledge, the College trains the next generation of engineers who will make a difference in our world.

**The Department of Biological and Agricultural Engineering** combines study in engineering with instruction in the biological sciences to solve challenging environmental and technical problems.

**The Department of Biomedical Engineering** educates students in a highly interdisciplinary combination of the biological sciences and engineering as this combination applies to medicine.

**The Department of Chemical Engineering** offers curricula integrating knowledge of chemistry, biological sciences and engineering that enable students to solve problems in current and future chemical, biochemical and manufacturing technologies.

**The Department of Civil and Environmental Engineering** educates students to plan and design safe and sustainable infrastructure systems that have a direct impact on the quality of human life and on health and human productivity.

**The Department of Computer Science** offers programs in all aspects of the design and use of computer hardware and software systems. The department also plays a significant service role for programs throughout the campus.

**The Department of Electrical and Computer Engineering** offers programs in research and education crucial for the continued success of high technology industries in California and the nation, preparing students to design, analyze and use electronic and computer systems effectively.

**The Department of Materials Science and Engineering** offers curricula integrating knowledge of physics, chemistry, mathematics, micro-level structure, thermodynamics, and kinetics that enables students to select engineering materials and solve design problems in both current and future technologies or to analyze the nanostructure-properties relationships and behavior of materials.

**The Department of Mechanical and Aerospace Engineering** educates students in the design and manufacture of complex engineering systems for transport, industry or energy and in the design, manufacture and operation of aircraft and aerospace structures.

Every effort has been made to provide engineering students with the maximum flexibility consistent with rigorous professional education standards. The key to flexibility is academic advising. As an incoming student, you will be given the name and office hours of your departmental staff adviser; you should arrange to meet with your adviser before you register for courses for the first time.

Undergraduate education in engineering at UC Davis serves as a sound basis for beginning professional practice in engineering design and development, as a preparation for careers in corporate or governmental operations and as a foundation for graduate study. To these ends, the college emphasizes fundamental sciences to give students the maximum postgraduate flexibility. In order to remain relevant in a quickly changing technical world, engineering education must be based on fundamentals or rapidly become obsolete.

Engineers will continue to face new challenges in the race to improve the quality of life for everyone and keep our state and nation competitive in the global marketplace.

As part of one of the nation's 76 land-grant institutions, UC Davis Engineering's mission is to help maintain the United States' technical leadership and advance technology for the benefit of everyone.

## The College of Letters and Science

Undergraduate Education and Advising Office  
200 Social Sciences and Humanities Building  
530-752-0392; <http://www.ls.ucdavis.edu>

The College of Letters and Science provides students with the opportunity to actively engage the central academic disciplines of the university. Founded in 1951, the College of Letters and Science is the largest of the schools and colleges at UC Davis, the University of California's most comprehensive university. The college is comprised of three divisions encompassing the broadest offering of disciplines at UC Davis: Humanities, Arts and Cultural Studies; Mathematical and Physical Sciences; and Social Sciences. The college's 650+ faculty members teach the core curriculum for virtually all 23,000 undergraduate students in the university as well as mentoring thousands of graduate students pursuing more than 50 fields of interest in the college. The college confers Bachelor of Arts (A.B.), Bachelor of Science (B.S.) and Bachelor of Arts and Science (B.A.S.) degrees.

The College of Letters and Science is a community of scholars and students sharing a commitment to liberal education rather than to specialized, vocationally-oriented training. The college exposes you to the worlds of human experience, of ideas, of artistic accomplishments and of matter and things. Within this curriculum you are able to explore a variety of academic fields, engage in the pursuit of fundamental knowledge and gain the capacity for independent study and thought. By learning to think carefully and critically, you will be able to continue the ongoing process of education that begins in the classroom but continues over a lifetime. You will have learned how to learn—the ultimate objective of a liberal arts education.

The educational goals of the college are reflected in the three primary groups of requirements established by the faculty: the English Composition Requirement, the Foreign Language and Area Requirements and the Major Requirements.

The **English Composition Requirement** ensures that you are well versed in written communication skills.

The **Foreign Language and Area Requirements** provide you with a broad background of knowledge, guide you in an exploration of the interdependencies of knowledge and acquaint you with other cultures.

The College of Letters and Science acknowledges the value of language learning and encourages students to acquire proficiency in a foreign language before graduating from UC Davis. The goals of language learning are the following: communicating complex ideas in the target language; acquiring understanding of a variety of cultural perspectives and differences; fostering intercultural communicative competence; gaining access to cultural production from another time and place; enhancing knowledge of other disciplines through the target language; recognizing the nature and structure of languages, including one's own; and developing the capacity to participate actively in multilingual communities both at home and abroad.

The **Major Requirements** provide you with intellectual depth and competence in a selected area of study.

The college has a well-developed system of faculty advisers, professional staff advisers and student peer advisers who are available for individual consultations with undergraduates in a variety of settings, from the college undergraduate education and advising office to departmental offices to campus residence halls.

The strength of the college lies in the faculty's commitment to advancing the frontiers of human knowledge through research, artistic expression and other creative endeavors and to the effective communication and application of that knowledge through teaching and public service. Together, faculty and students in the College of Letters and Science create a climate that enables students to achieve their highest potential.

## GRADUATE STUDY

Office of Graduate Studies  
250 Mrak Hall  
530-752-0650; <https://gradstudies.ucdavis.edu>

Graduate students at UC Davis have the opportunity to work with and learn from accomplished faculty, recognized for their contributions to research in their fields. The Office of Graduate Studies oversees nearly 100 graduate programs leading to master's and doctoral degrees, which together enroll approximately 4,800 graduate students. Many graduate programs are offered through gradu-

ate groups, an interdisciplinary concept that allows students to study and work with faculty in interrelated areas to broaden their intellectual experiences; see [Graduate Studies, on page 119](#).

## PROFESSIONAL STUDY

UC Davis has six professional schools—the School of Law (J.D.), the School of Medicine (M.D.), the School of Veterinary Medicine (D.V.M., M.P.V.M.), the School of Education (M.A., Ph.D., Ed.D.), the Betty Irene Moore School of Nursing (M.H.S., M.S., Ph.D.), and the Graduate School of Management (M.B.A., M.P.A.c.). These schools and programs are described in later chapters.

Students interested in reviewing WASC accreditation documents may do so at <http://wasc.ucdavis.edu>. Those interested in reviewing profession-specific accreditation documents should contact the relevant Dean's office.

## ACADEMIC RESOURCES

### The University Library

530-752-8792; <http://www.lib.ucdavis.edu>

The University Library is an integral part of the University of California, Davis, and one of the top research university libraries in the U.S. It also participates in and benefits from the collective activities of the University of California's system of libraries and the California Digital Library. The Library's omnidisciplinary and highly regarded collections and research services have long supported the faculty, students and researchers of the university, the health care professionals of the UC Davis Health System, and the citizens of California.

The Library's vision is to be the academic hub of UC Davis, advancing research, education, and innovation in a networked world. The Library is an interdisciplinary resource for the entire community that enables transformative research and education through its provision of critical scholarship, tools, and services.

The University Library is comprised of four facilities: the Peter J. Shields Library, the Physical Sciences & Engineering Library, the Loren D. Carlson Health Sciences Library, and the F. William Blaisdell Medical Library in Sacramento. The combined physical collections of the University Library total more than 4 million volumes. An extensive variety of journal titles, government documents, maps, microfilms, media, and other formats are also part of the collection. The law library, administered by the School of Law, is located in King Hall. The Library also has extensive digital holdings, such as e-journals and e-books and digital materials collected from the UC Davis community. These online collections are available anytime from anywhere, to support the needs of 21st Century scholars. The campus wireless network is available within all libraries and connects authorized users to library and campus resources and services.

Library services and resources information is available at <http://www.lib.ucdavis.edu>. In addition, the Library's online catalogs identify library collections at UC Davis and at the other nine UC campuses. The Library provides classes on the use of modern online tools for finding and using digital content, as well as subject specific electronic journals and databases. Subject specialist and teaching librarians and digital scholarship experts are available for consultation to identify and use information resources for research, and to use those resources for new types of scholarship.

## UC Davis Arboretum and Public Garden

Arboretum and Public Garden Headquarters  
530-752-4880; <http://arboretum.ucdavis.edu>

UC Davis—already known for its heritage trees and park-like atmosphere—elevated the profile of its outdoor spaces by launching the UC Davis Arboretum and Public Garden in 2011. Through close partnerships with students, academic departments, and community members, the UC Davis Arboretum and Public Garden seeks to provide a visitor-friendly, living museum complete with educational and sustainable landscapes that showcase our campus's academically-diverse expertise hand-in-hand with programs that allow for a wide-range of community participation including student internships, volunteer opportunities, and all-ages programming highlighting environmental sustainability, the arts and sciences.

One of the gems of the campus landscape is the 103-acre UC Davis Arboretum, founded in 1936, which contains a documented collection of more than 50,000 trees, shrubs and perennials from Mediterranean-climate areas throughout the world. Here visitors enjoy winding paths for walking, jogging, and bicycling, benches for enjoying the views, and picnic tables for casual gatherings. Demonstration gardens of drought-tolerant flowering perennials and collections of California native plants, oaks, acacias, conifers, and eucalyptus are resources for teaching and research; these landscapes also serve as a backdrop for a diverse array of events in addition to operating as an outdoor gallery for student and community-created art.

Students are integral to the Arboretum and Public Garden's vision for transforming our campus grounds into an engaging outdoor experience. Through its Learning by Leading Program, students participate in internships where they gain environmental leadership skills in sustainable horticulture, edible landscaping, nursery management, naturalized land management, and education and outreach. In addition, students, as well as community members, are also invited to volunteer for short-term projects ranging from event management to garden planting.

Although still in its infancy, the UC Davis Arboretum and Public Garden is gaining national attention for its sustainable landscape management as well as its practice of harnessing community collaboration to enhance the visitor experience.

## Information and Educational Technology

Information and Educational Technology (IET) provides a wide range of services and support to undergraduate and graduate students. For more information, see <http://iet.ucdavis.edu/student/index.html>.

A good place to get more information about IET's services is [itcatalog.ucdavis.edu](http://itcatalog.ucdavis.edu).

For answers to your campus technology questions, you can find the IT Knowledge Base at <http://kb.ucdavis.edu>.

For campus IT help, contact the IT Express Service Desk at 530-754-HELP (4357); [ithelp@ucdavis.edu](mailto:ithelp@ucdavis.edu).

## Taking Care of Business Online

- Enroll in classes, add or drop courses, view and print your class schedule
- Access course grades

- View and print your unofficial academic record
- Check balances, view bills, make payments, and manage your student account
- Apply for and view financial aid awards
- Plan your class schedule and pre-check your registration status with Schedule Builder
- Make campus bookstore purchases; see <http://ucdavisstores.com>

### **Learning and Teaching with Technology**

- **The campus has two Learning Management Systems (LMS) in 2016-17: SmartSite, which is being retired, and UC Davis Canvas, which is being phased in.** Talk with your instructors to see which LMS they are using for your courses during 2016-17. You can use the LMS to communicate with your instructors and fellow students; work together on papers and projects; manage assignments, study, and more. See <http://movetocanvas.ucdavis.edu/> for information about UC Davis Canvas, and <http://smartsite.ucdavis.edu> for information about SmartSite
- **Searchable electronic databases.** Find them at Shields Library. You'll have free, easy access from on- or off-campus; see <http://www.lib.ucdavis.edu>
- **iTunes, YouTube and podcasting.** Digital audio recording equipment is installed in several lecture halls, and portable digital recorders are available for rental from IET-Academic Technology Services (Surge II). Audio and video podcasting services are available to all instructors and campus groups; see [&](http://podcasting.ucdavis.edu) <http://itunes.ucdavis.edu>
- **Classroom technology.** All 128 general assignment classrooms have audio, network and projection capabilities, and include a projector, CD player, DVD player, VCR, built-in microphone and laptop hook-up. Classrooms with more than 50 seats also have assistive hearing systems; see <http://registrar.ucdavis.edu/faculty-staff/classroom/>
- **Lecture Capture.** Academic Technology Services is working with the Office of the University Registrar to provide automated lecture capture technology in 20 of our General Assignment classrooms. These lecture-capture rooms have the ability to record video, audio and lecture content and automatically publish these recordings to the instructors SmartSite for viewing by students. For more information, contact [ats@ucdavis.edu](mailto:ats@ucdavis.edu); see <https://video.ucdavis.edu>

### **The Essentials: Computers, Email, Software, Labs**

- **Email.** Every student has a free Gmail-based email account; see <http://itcatalog.ucdavis.edu/service/davismail>
- **Computer purchases.** Our recommendations can help guide your purchases. Financial aid is available for qualified applicants; see <http://computerownership.ucdavis.edu>. To buy computers and accessories at the campus bookstore, see <http://ucdavisstores.com>
- **Software.** Various programs are available free of charge or at a discount; see <http://software.ucdavis.edu>
- **The Virtual Lab** lets you remotely log on to software in IET's computer labs after hours; see <http://virtuallab.ucdavis.edu>
- **Multimedia.** You'll want to check out the video, audio, and graphic design software, as well as printers, scanners, etc., in the IET Media Lab; see <http://ietmedialab.ucdavis.edu/>

• **Computer rooms.** Computer classrooms and labs distributed around the campus provide access to PCs, Macs and printers. Some labs have both Mac and PC computers, and many have extended hours during the week; see <http://ats.ucdavis.edu/services/computer-rooms/>

- **Printing.** All computer rooms are equipped with printers; see <http://clm.ucdavis.edu/rooms/printing>. You can also send a print job from your computer to any printer in five locations; see <http://wirelessprinting.ucdavis.edu>

### **Networking**

- **Wireless Internet.** Eduroam is the campus wireless network. For access requirements and instructions, see <http://itcatalog.ucdavis.edu/service/wireless-guest-access>
- **Wired Internet.** Students living on campus can also connect to the Internet by using ResNet, the high-speed residence hall network. Each residence hall also has a computer center with computers, printers, and scanners; see <http://www.housing.ucdavis.edu/computers/>

### **Security**

**Computer security.** Blocking computer viruses and preventing unauthorized access to computing systems are important parts of campus computing life; see more information at <http://security.ucdavis.edu>.

### **Technical Support**

**IT Express.** Free computing help with almost anything related to campus tech. Call 530-754-HELP (4357) or see <http://kb.ucdavis.edu>, <http://itexpress.ucdavis.edu>, or <https://www.facebook.com/ucditx>.

All information above is current as of spring 2016. News about campus technology is distributed via TechNews at <http://technews.ucdavis.edu>.

## **RESEARCH PROGRAMS AND RESOURCES**

### **Organized Research Units**

Organized Research Units (ORUs) are campus-wide interdisciplinary research programs that further the university's missions of teaching, research and public service, but do not offer courses of instruction. Members of an ORU come from more than one department and normally from more than one school, college division.

### **Air Quality Research Center (AQRC)**

3050 Bainer Hall 530-754-6558  
Anthony Wexler, Director; [aswexler@ucdavis.edu](mailto:aswexler@ucdavis.edu)  
<http://airquality.ucdavis.edu/>

The Air Quality Research Center provides support for teams of collaborative researchers to conduct scientific, engineering, health, social and economic research to inform planning and regulations for air quality and climate change. The AQRC educates through conferences, outreach, scholarly publications, and training grants. Researchers at UC Davis employ theoretical approaches, mathematical models, measurements in the field and in laboratories, and policy analysis to tackle state, federal and intercontinental air quality problems. The center is composed of over 60 faculty and

research staff members from six schools and colleges across campus. This breadth of expertise allows us to take a broad, interdisciplinary approach to air-quality problem solving.

### Bodega Marine Laboratory and Reserve

Bodega Marine Laboratory  
P.O. Box 247  
Bodega Bay, CA 94923  
707-875-2211; Fax 707-875-2009  
[ucdbml@ucdavis.edu](mailto:ucdbml@ucdavis.edu); <http://bml.ucdavis.edu>

The Bodega Marine Laboratory is dedicated to research and teaching in marine science. Research areas include: **Ecology and Evolution**—invasive species, biodiversity, community ecology, etc., **Coastal Oceanography**—upwelling, estuaries and land runoff, nearshore hydrodynamics, ocean observing, **Ocean Health**—developmental and reproductive toxicology, shellfish health, environmental assessment, **Physiology**—comparative physiology and biochemistry, reproductive physiology, seagrass and seaweed physiological ecology, **Conservation**—fisheries management, marine protected areas, endangered species restoration, **Climate Change**—ecological impacts, ocean acidification, paleoceanography. Well-equipped facilities feature running seawater in two classrooms and many laboratories, a marine science library, lecture hall, housing facilities, computer labs, state of the art microscopy imaging facility, experimental climate change facility, greenhouses, experimental freshwater system for anadromous/estuarine invertebrate and fish studies, network of automated environmental sensors on marine and terrestrial habitats, 42-foot research vessel and various small boats, and a dive locker and air station. Faculty teach a number of undergraduate and graduate courses during the academic year and summer session. The laboratory is located in Bodega Bay, Sonoma County, 100 miles west of Davis.

The Bodega Marine Reserve, part of the UC Natural Reserve System, is 362 acres of remarkably diverse habitats, including an excellent rocky intertidal zone, sand beaches, saltmarsh, lagoon tidal flats, freshwater marsh, coastal prairie and dunes. The reserve also administers adjacent subtidal sand and rock habitats in a marine life refuge. Areas of research include a broad spectrum of field studies of plants and animals in coastal marine, intertidal and terrestrial ecosystems.

### California National Primate Research Center

Primate Center  
530-752-0447; <http://www.cnprc.ucdavis.edu>

The California National Primate Research Center (CNPRC) is a local, regional, and national resource to furthering scientific discovery, using biomedical research to make breakthroughs in health and science, leading to new diagnostics, therapeutics, and clinical procedures that enhance quality of life for both humans and animals. The CNPRC is an Organized Research Unit of the University of California, Davis and part of the National Primate Research Centers Program at the National Institutes of Health.

Under the direction of UC Davis faculty, the CNPRC is comprised of four research units that emphasize translational studies in Brain, Mind and Behavior, Infectious Diseases, Reproductive Sciences and Regenerative Medicine, and Respiratory Diseases. Research projects using nonhuman primates contribute in substantial ways to health care and are developing a better understanding of, and new treatments for, a wide range of human health problems

including asthma, HIV/AIDS, childhood illnesses, Alzheimer's disease, emerging infectious diseases, and environmental toxins that impact our health.

The CNPRC supports self-sustaining, genetically characterized breeding colonies of rhesus macaques and titi monkeys that are also studied for natural behaviors and spontaneously occurring disorders. Educational experiences at the CNPRC are available for undergraduate and graduate students, as well as veterinary residents.

### Center for Health and the Environment

530-752-1340; <http://che.ucdavis.edu>

The Center for Health and the Environment (CHE) coordinates and engages in interdisciplinary research on environmental agents, including chemicals and radiation, and health outcomes in humans, animals and other organisms. Researchers conduct epidemiologic studies in human populations, as well as experiments in whole animals, organisms, cells and molecules. Research on the development of agents for population control of humans and wildlife seek to mitigate the adverse effects of overabundance on the environment. Studies on toxic, radioactive, mutagenic, carcinogenic and teratogenic compounds are carried out in special animal holding facilities. Laboratories are equipped for studies in analytical chemistry, biochemical toxicology, cell and molecular biology, endocrinology, inhalation toxicology, morphology and reproductive and developmental biology. The Center houses a major university-wide program and federally funded center in occupational and agricultural medicine, nanotechnology and, a School of Medicine program in reproductive biology.

### Crocker Nuclear Laboratory

530-752-1460; <http://crocker.ucdavis.edu>

The Crocker Nuclear Laboratory is an interdepartmental laboratory for the application of nuclear science to a variety of disciplines, including air pollution and visibility, nuclear physics and chemistry, medical therapy with proton beams, material damage studies, and the effect of background and extraterrestrial radiation on electronic components.

### Institute for Data Analysis and Visualization

2343 Academic Surge 530-752-0481  
Kenneth Joy, Director; [kijoy@ucdavis.edu](mailto:kijoy@ucdavis.edu)  
<http://idav.ucdavis.edu>

The mission of the Institute is the integration of research efforts at UC Davis in data analysis and visualization. The Institute draws students and faculty from a variety of departments and colleges, allowing researchers to work together on real-world, applied problems that deal with the massive data analysis and visualization problems encountered in science, engineering, and other fields. The integration of the two fields, especially in biological applications of high throughput biological assay data such as gene expression arrays, proteomics, metabolomics and NMR spectroscopy, produce methods that impact a substantial number of scientific fields. In neuroscience, computer science, computational science, computational physics, and engineering applications, the Institute contributes data exploration and problem-solving methods through visualization, computer graphics, data analysis, and expressive interfaces that enable discovery and analysis from massive information streams. The collaborative efforts of the faculty

and students of the Institute enable the University to address a wide-variety of application areas and contribute methods that enable scientists and engineers to make decisions from their data.

### Institute of Governmental Affairs

360 Shields Library  
530-752-0966; Fax 530-752-8666; <http://www.iga.ucdavis.edu>

The Institute of Governmental Affairs (IGA) serves as a research base for social science faculty at UC Davis. IGA serves approximately 60 faculty from 10 campus departments as well as scholars visiting from throughout the United States and around the world.

Located in the core of the UC Davis campus, IGA houses eight formal research programs: Center for International Data; Center for State and Local Taxation; Center for the Evolution of the Global Economy; Conflict Processes Group; Economy, Justice and Society (EJS); Migration Dialogue; the Network Sciences Group; the Public Opinion Workshop, and the Rural Economies of the Americas Program (REAP).

Specialized services include grant advising, preparation and administration; research program development; library and data services; social science computing, programming and statistical consulting; seminar, workshop and conference organization; and much more. The institute sponsors an active public affairs program and enhances the education of students by providing research opportunities. IGA serves as the UC Davis liaison to the system-wide program, Institute on Global Conflict and Cooperation (IGCC) and the All-UC Group in Economic History.

### Institute of Transportation Studies

West Village, 1605 Tilia St, Suite 100; 530-752-6548  
Dan Sperling, Director; [dsperling@ucdavis.edu](mailto:dsperling@ucdavis.edu)  
<http://www.its.ucdavis.edu>

The Institute of Transportation Studies conducts multidisciplinary research on complex problems related to the transportation system and disseminates research results to the broader academic and professional community. Research priorities are travel behavior, alternative-fueled vehicle technology and policy, energy and environmental projects and advanced vehicle and highway systems. About 60 faculty members and 130 graduate students from more than 13 academic disciplines, including four Engineering departments, Economics, Environmental Science and Policy, Ecology, Agricultural and Resource Economics, and the Graduate School of Management, participate in the research activities of the Institute. The Institute administers a graduate program in Transportation Technology and Policy, and a number of research centers, including the National Center for Sustainable Transportation, the UC Davis Energy Efficiency Center (EEC), the UC Davis Plug-In Hybrid Electric Vehicle (PH&EV) Center, the Sustainable Transportation Energy Pathways (NextSTEPS) program, the UC Davis Western Cooling Efficiency Center (WCEC), the China Center for Energy and Transportation (C-CET).

### John Muir Institute of the Environment

Mark Schwartz, Director 530-754-9135

The John Muir Institute of the Environment (JMIE) supports innovation and discovery aimed at solving real-world environmental problems. The Institute's faculty are committed to strengthening the scientific foundation for environmental decision making through collective entrepreneurship, a team-oriented approach

that recognizes the complexities of environmental problems and the societal context in which they occur. JMIE champions science and technological innovation, provides campus-wide leadership, hosts centers and projects, and seeds research and educational initiatives to solve real-world environmental problems. Focal areas include water quantity and quality, impacts of particulates in human health, climate change and natural resource management. The Institute links science and technology to policy by providing the intellectual setting for interactions between researchers, regulatory agencies, policy-makers and the public.

### Nanomaterials in the Environment, Agriculture and Technology (NEAT)

4415 Chemistry Annex 530-752-3292  
Alexandra Navrotsky, Director; [anavrotsky@ucdavis.edu](mailto:anavrotsky@ucdavis.edu)  
<http://neat.ucdavis.edu>

NEAT is a multidisciplinary research and education program linking the fundamental physics, chemistry, and engineering of small particles and nanomaterials to several challenging areas of investigation, including applications in ceramic, chemical, electronic, environmental, and agricultural technology; environmental transport and transformation and the resulting factors of environmental pollution and remediation; and interactions with the biosphere, especially microorganisms and the consequential effects on health.

### Program in International and Community Nutrition

Kathryn G. Dewey  
3253 Meyer Hall  
530-752-1992; Fax 530-752-3406; [kgdewey@ucdavis.edu](mailto:kgdewey@ucdavis.edu)  
<http://picn.ucdavis.edu>

Faculty members of the Program in International and Community Nutrition are studying the epidemiology and causal mechanisms of the major nutritional problems of human populations in low-income countries and in disadvantaged ethnic minority groups in the United States, with the ultimate objective of planning, implementing and evaluating programs to ameliorate these problems. Current areas of research include maternal and child nutrition, control of micronutrient deficiencies, determinants of food intake, nutrition and infection, nutritional assessment, and food and nutrition programs and policy.

### ADDITIONAL RESEARCH CENTERS AND RESOURCES

#### Adult Fitness Program

UC Davis Sports Medicine Program  
916-734-6805

The UC Davis Adult Fitness Program is designed to help individuals improve their health and physical fitness to prevent disease and improve quality of life. Our team of exercise specialists includes sports medicine physicians, exercise physiologists and nutritionists trained by UC Davis Sports Medicine, Exercise Biology and Nutrition Faculty in exercise testing and prescription and sports nutrition. This program exists to provide a public health service to the university and surrounding communities; to provide clinical learning opportunities for UC Davis students; to provide opportunities to study the benefit of exercise and proper nutrition in the prevention of disease and assist individuals in evaluating their progress through discounted repeat testing and evaluation.

## **Advanced Highway Maintenance & Construction Technology (AHMCT) Research Center**

Academic Surge 1003 530-752-5981  
 Steve Velinsky, Director; [savelinsky@ucdavis.edu](mailto:savelinsky@ucdavis.edu)  
 Bahram Ravani, Director; [bravani@ucdavis.edu](mailto:bravani@ucdavis.edu)  
<http://www.ahmct.ucdavis.edu/>

In cooperation with state, federal, and private agencies as well as private industry, the Center for Advanced Highway Maintenance and Construction performs applied and basic research to develop innovative technologies in the areas of highway and civil infrastructure construction, maintenance, and operations. Our ultimate goal is the deployment of these technologies. Our efforts center on safety, mobility, lean operations, reliability, and the minimization of environmental impacts. To achieve these aims, we combine and leverage advanced automation and robotics, information technology, sensing and mechatronics, design and sustainability, life-cycle analysis, and advanced communication and computer technologies.

The Center works directly with California Department of Transportation (CALTRANS) also helps them access university and industry research, maintain a leadership position in maintenance and construction technology, access federal and pooled funds for research, test and evaluate new technologies, improve the Caltrans public image as a technology-oriented organization, and train students and professionals in transportation operations and technology.

## **Advanced Materials Characterization and Testing Laboratory (AMCaT)**

Kemper Hall; lower level  
 Lab Manager: Fred Hayes; [fahayes@ucdavis.edu](mailto:fahayes@ucdavis.edu)  
<http://chms.engineering.ucdavis.edu/research/amcat/index.html>

The AMCaT labs place their major emphasis on analytical electron microscopy (micro analysis) in the material sciences. The vision and goal of AMCaT is to embrace and support a multi-disciplinary user base of students (undergraduate and graduate), post doctoral fellows, and faculty researchers at UC Davis. The facility also offers its users a variety of sample preparation equipment, a light microscopy lab with image analysis, an x-ray lab, and a materials testing lab. AMCaT supports numerous lab classes in engineering.

## **Advanced Transportation Infrastructure Research Center Facility (ATIRC)**

West Campus  
 John Harvey, Director (UCPRC); [jtharvey@ucdavis.edu](mailto:jtharvey@ucdavis.edu)

The UC Davis Advanced Transportation Infrastructure Research Center (ATIRC) project provides a facility for two research programs: the UC Pavement Research Center (UCPRC) and the Advanced Highway Maintenance and Construction Technology Research Center (AHMCT). Research at the UCPRC at ATIRC includes accelerated pavement testing of new types of materials and pavement structures using the Heavy Vehicle Simulators, laboratory specimen preparation and testing, and analyses. ATIRC houses the UC Davis staff of the UCPRC.

## **Agricultural Sustainability Institute**

Thomas P. Tomich, Director  
 143 Robbins Hall  
 530-752-3915; Fax 530-752-2829; [asi@ucdavis.edu](mailto:asi@ucdavis.edu)  
<http://asi.ucdavis.edu/>

The Agricultural Sustainability Institute (ASI) is a hub linking research, education, and outreach in sustainable agriculture and food systems across all divisions of the College of Agricultural and Environmental Sciences at UC Davis, across the University of California, and with other partners across the state, nation, and planet. ASI includes:

- Advising and internship coordination for the UC Davis undergraduate major in Sustainable Agriculture and Food Systems.
- UC Davis Student Farm.
- UC Davis Russell Ranch Sustainable Agriculture Facility.
- UC ANR statewide Sustainable Agriculture Research & Education Program (SAREP).
- The Inter-institutional Network on Food, Agriculture and Sustainability (INFAS), a national academic network.

## **California Agricultural Experiment Station**

College of Agricultural and Environmental Sciences  
 530-752-1610

The California Agricultural Experiment Station has branches on the UC Davis, UC Riverside and UC Berkeley campuses. The UC Davis branch includes approximately 400 faculty and CE Specialists, mostly in the College of Agricultural and Environmental Sciences, but also in the College of Biological Sciences and the School of Veterinary Medicine. In addition to laboratory facilities, it has approximately 3,000 acres devoted to field research in the environmental and crop sciences, as well as facilities to support animal and long-term experimental research. The Experiment Station supports faculty in research involving agricultural production, food processing, nutrition, animal care and disease prevention, consumer sciences and community development and in natural resources and ecosystem science management, with an emphasis on maintaining and improving environmental quality of both natural and managed ecosystems.

## **Center for Advanced Laboratory Fusion Science and Engineering (CALFUSE)**

3001 Ghausi Hall 530-754-9069  
 Neville Luhmann, Director; [ncluhmann@ucdavis.edu](mailto:ncluhmann@ucdavis.edu)  
 David Hwang, Director; [dqhwang@ucdavis.edu](mailto:dqhwang@ucdavis.edu)  
<http://calfuse.ucdavis.edu/>

The purpose of Center for Advanced Laboratory Fusion Science and Engineering (CALFUSE) is to promote interaction between research and educational entities within the University and among the University, the national laboratories, and industrial laboratories. Fusion research is an extremely broad field, encompassing topics that cut across numerous engineering, science, and policy disciplines. The initial set of topics includes plasma accelerators, high-energy particle accelerators, plasma diagnostics (specifically, millimeter wave and Terahertz technology developments), advanced computing, advanced materials, and energy policy. The Center invites participation from all fields that may have relevance to fusion education and research.

## Center for Biophotonics (C4B)

2700 Stockton Blvd., Suite 1400  
 Sacramento, CA 95817 916-734-8600  
 Dennis Matthews, Director; [dmatthews@ucdavis.edu](mailto:dmatthews@ucdavis.edu)  
<http://cbst.ucdavis.edu/>

The Center for Biophotonics applies biophotonics—the science of light interaction with biological matter—to solve problems in biology and medicine. Work at C4B advances the research, development, and application of new optical/photonics tools and technologies in medicine and the life sciences, enabling engineers to collaborate with basic scientists and physicians at the UC Davis Medical Center to translate new technologies from the benchtop to the bedside. Center projects are highly diverse and include superresolution optical microscopies, advanced imaging and manipulation of living cells and other biological systems, engineered fluorescent proteins, label-free cell analysis by Raman spectroscopy and second harmonic generation, molecular sensors and assays, *in vitro* and *in vivo* devices and assays for diagnosis, monitoring and treatment of disease.

C4B is the successor of the NSF Center for Biophotonics Science and Technology, which was funded by the National Science Foundation and participating institutions between 2002-2013.

## Center for Child and Family Studies

Center for Child and Family Studies (main office in West House)  
 530-752-2888; <http://ccfs.ucdavis.edu>

The Center for Child and Family Studies (CCFS) houses the Early Childhood Laboratory (ECL), a research, teaching and demonstration laboratory of the Division of Human Development and Family Studies in the Department of Human Ecology. At the ECL, students enrolled in human development courses learn observational techniques and participate with peers, children, parents and professionals in developmental programs for infants through preschoolers. Students study early development in a naturalistic setting, linking research and theory to principles of interaction, and learning about developmental differences. Selected undergraduate students participate in faculty and graduate student research at the laboratory. The CCFS also houses several research and outreach facilities, including the Eichhorn Family House.

## Center for Geotechnical Modeling

2655 Brooks Road 530-752-7929  
 Ross W. Boulanger, Director; [rwboulanger@ucdavis.edu](mailto:rwboulanger@ucdavis.edu)  
<http://cgm.engineering.ucdavis.edu/>

The Center performs research in the broad area of geotechnical engineering, with a focus on earthquake engineering problems such as dynamic site response, liquefaction, ground failure, and soil-foundation-structure interaction for buildings, bridges, dams, tunnels, and port facilities. The Center emphasizes physical modeling using one of the world's largest and most advanced geotechnical centrifuge facilities, but also performs numerical simulations using advanced computational tools, develops design procedures, and develops new techniques for site characterization. The centrifuge is available for shared use by researchers from around the country and is supported by NSF's National Hazards Engineering Research Infrastructure program.

## Center for Information Technology in the Interest of Society (CITRIS)

2101 Academic Surge Building  
 Bahram Ravani, Director and Professor of Mechanical & Aerospace Engineering;  
<http://ucdavis.citrис-uc.org>

The Center for Information Technology Research in the Interest of Society (CITRIS) is one of the California Institutes of Science and Innovations with a mission of investigating information technology solutions for society's most pressing challenges. The Center involves a partnership among four UC campuses: UC Davis, UC Berkeley, UC Merced and UC Santa Cruz and operates within the greater ecosystem of the University of California and the innovative and entrepreneurial spirit of northern California.

CITRIS was created to "shorten the pipeline" between world-class laboratory research and the creation of start-ups, larger companies, and whole industries.

CITRIS facilitates partnerships and collaborations involving faculty members and students from numerous departments at the four UC campuses with industrial and other collaborators. Current CITRIS initiatives include Sustainable Infrastructures (pursuing research in cyber-infrastructure of a sustainable society); Connected Communities (supporting collaborative discovery, design, and governance through new technologies that enhance education, creative work, and public engagement); People and Robots (addressing approaches and challenges in Cloud Robotics, Deep Learning, Human-Centric Automation, and Bio-Inspired Robotics in the interest of the society); and Health (developing innovative technologies in telehealth, sensors, analytics and mobile devices to improve health outcomes and access to cost-effective healthcare).

## Center for Mind and Brain

267 Cousteau Place, Davis, CA 95618 530-297-4651  
 Steven J. Luck, Director;  
<http://mindbrain.ucdavis.edu/>

The Center for Mind and Brain is an interdisciplinary research center that is dedicated to understanding the nature of the human mind. Our scientists probe the mind using state-of-the-art approaches from the social, biological, engineering, and medical sciences. Our core research areas include attention, development and aging, memory, multisensory integration, music, and disorders of mind and brain. We focus on both discovering the fundamental principles of the healthy human mind and understanding and treating conditions such as autism, schizophrenia, and Alzheimer's disease.

## Center for Molecular Genomic Imaging (CMGI)

451 Health Sciences Drive 530-754-8960  
 Simon Cherry, Director; [srcherry@ucdavis.edu](mailto:srcherry@ucdavis.edu)  
<http://imaging.bme.ucdavis.edu/>

The Center for Molecular Genomic Imaging (CMGI) offers the research community dedicated, state-of-the-art imaging technologies for *in vivo* and biospecimen imaging. Imaging modalities include PET, SPECT, CT, MRI, ultrasound, autoradiography, and optical imaging (fluorescence and bioluminescence). CMGI also operates a biomedical cyclotron and radiochemistry facility for synthesis of radiotracers. The CMGI has become a core facility serving a wide range of campus investigators and is integrated into many major centers, programs, and institutes.

Imaging studies can provide new insights in many areas of biomedical research, including oncology, cardiology, neuroscience and pharmacology. Molecular and genomic imaging can play an important role in advancing basic science investigations and in the development of new diagnostic and therapeutic approaches for use in the clinical setting. CMGI staff provide services that include consultation, protocol planning and experimental design, animal handling and physiologic monitoring, injection of contrast agents and radiopharmaceuticals, scanning, data reconstruction and visualization, image analysis and data backup. CMGI facilities are open to all researchers at UC Davis, and are also open, on a space-available basis, to external researchers.

## **Center for Nano and Micromanufacturing**

West Wing Kemper Hall; Office: 1125 Kemper Hall;  
530-574-7138  
Corey Wolin, Manager; [cdwolin@ucdavis.edu](mailto:cdwolin@ucdavis.edu)  
<http://ncnc.engineering.ucdavis.edu/>

The Center for Nano and Micromanufacturing (CNM2) includes a 10,000 square-foot Class 100 cleanroom, offering a broad line of lithography tools with resolution capabilities down to 50nm, metal and dielectric thin-film deposition, dry etching, as well as numerous characterization tools to support device manufacturing for a variety of industries and applications. The facility has capabilities to accommodate a wide variety of substrate materials including: Si, SiO<sub>2</sub>, borosilicate glass, InP, GaAS as well as biocompatible polymer materials such as PDMS. External to the cleanroom we have an additional 5000+ square feet of research space which houses both a high-resolution SEM and FIB system used for sample characterization and TEM sample preparation. The staff is available from 9:00 a.m.-5:00 p.m. (PT) to assist internal and external users with process development and training to help streamline research projects.

## **Center for Neuroscience**

Cameron Carter, Director  
1544 Newton Ct., Davis, CA 95618  
530-757-8708; Fax 530-757-8827;  
<http://neuroscience.ucdavis.edu>

The Center for Neuroscience is an interdisciplinary unit that serves as the focal point for the study of the neurosciences at UC Davis. Faculty affiliated with the Center are from 13 departments and sections. The center sponsors a seminar series, conferences and symposia, provides research space for center members and supports graduate students, postdoctoral scholars and distinguished visitors.

Faculty and students are engaged in the study of brain mechanisms responsible for normal human cognitive and perceptual processes and in the study of fundamental aspects of nerve cell function and development. A core group of cognitive neuroscientists uses various imaging techniques and electrophysiological techniques to study both the normal and lesioned cerebral cortex to understand how the normal brain controls behavior. Other faculty members use either animal models to understand how information is processed in the brain or simple systems to study the fundamental biology of nerve function and development and disorders affecting them.

## **Center for Population Biology**

Storer Hall 530-752-1274  
Artyom Kopp, Director; [akopp@ucdavis.edu](mailto:akopp@ucdavis.edu)  
<http://cpb.ucdavis.edu>

The UC Davis Center for Population Biology (CPB) aims to advance understanding of the fundamental ecological and evolutionary processes that control the origins and maintenance of biological diversity, at all levels of organization ranging from molecules to ecosystems. Our activities promote integrative, multidisciplinary research in population biology through collaborations, mentorships, workshops and meetings. Faculty in the Center are drawn from nine academic departments and three colleges; Biological Sciences, Agricultural and Environmental Sciences, and Letters and Science.

## **Center for Science and Innovation Studies**

1246 Social Sciences and Humanities Building & 1127 King Hall  
Mario Biagioli, Ph.D., Program Director  
[http://innovation.ucdavis.edu/](http://innovation.ucdavis.edu)

The Center for Science and Innovation Studies (CSIS) studies the many dimensions of the process of technoscientific innovation. We focus predominantly on the upstream spectrum of innovation—from the design, articulation, and funding of research programs to the patenting and publication of their outcomes—paying particular attention to the process, practices, instruments, and techniques of innovation and to the conceptual and practical problems of knowledge transfer. Through detailed case studies (contemporary as well as historical), CSIS analyzes the role that training, cultural background, and cross-disciplinary mobility play in the emergence of innovation, as well as the new institutional, technical, and social arrangements that sustain it (from innovative laboratory architecture and university-industry configurations, to distributed and cyberinfrastructure-based collaborations, to alternative systems of publication and new metrics of quality and performance assessment). Intellectual property (both traditional regimes and more recent platforms like free software, open source, science commons, and norm-based reward systems) is a central focus of CSIS, as are issues pertaining to bioprospecting and the access to and reward of traditional knowledge.

## **Coastal and Marine Sciences Institute**

Storer Hall 530-752-1274  
Rick Grosberg, Founding Director; [rkgrosberg@ucdavis.edu](mailto:rkgrosberg@ucdavis.edu)  
<http://cmsi.ucdavis.edu>

The UC Davis Coastal and Marine Sciences Institute (CMSI) aims to catalyze and foster innovative partnerships for discovering, understanding, and communicating science for effective stewardship of ocean and coastal environments in California and beyond. We especially strive to build collaborations with diverse stakeholders, including private-sector organizations and corporations that have significant economic, social, and environmental interests in the coastal ocean and at the land-sea interface. We believe that such partnerships can lead to the development of sustainable policies that protect biodiversity, nurture ecosystems, and enhance beneficial uses of the ocean in parallel with socio-economic development. With its focus on humans and the coastal oceans, the institute assembles globally-recognized experts from more than 20 academic units on the main campus and Bodega Marine Laboratory. CMSI also coordinates research and academic programs cross campus, including a new major in Marine and Coastal Sciences, as well as emerging graduate and professional programs.

## Computer Security Laboratory

2063 Kemper Hall; [seclab-contact@cs.ucdavis.edu](mailto:seclab-contact@cs.ucdavis.edu)

Matt Bishop, Hao Chen, Karl Levitt, Felix Wu, Directors;  
[bishop@ucdavis.edu](mailto:bishop@ucdavis.edu), [hchen@ucdavis.edu](mailto:hchen@ucdavis.edu), [levitt@ucdavis.edu](mailto:levitt@ucdavis.edu), [wu@ucdavis.edu](mailto:wu@ucdavis.edu);  
<http://seclab.cs.ucdavis.edu/>

The mission of the UC Davis Computer Security Laboratory is to improve the current state of computer and information security and assurance through research and teaching. The Security Lab investigates security problems in the network infrastructure, in computer security, and in information assurance in general. Current projects include research into data sanitization, vulnerabilities analysis, social links, the provision of a secure programming clinic, forensic logging and auditing, e-voting and the process of holding an election, biology-inspired security techniques, and security of mobile networks and smartphones. The Security Laboratory also researches and detects malicious code (viruses, worms, time bombs, etc.) in programs and detects attempts to penetrate or misuse computer systems. Research projects are supported by corporate and government organizations.

## Genome Center

4303 Genome and Biomedical Sciences Facility 530-754-9648

Richard Michelmore, Director; [rwmichelmore@ucdavis.edu](mailto:rwmichelmore@ucdavis.edu)  
<http://genomecenter.ucdavis.edu>

The UC Davis Genome Center integrates experimental and computational approaches to address questions at the forefront of genomics and bioinformatics. The Center is housed in a purpose-built research building with state-of-the-art computational and laboratory facilities. The Center has resident and non-resident research faculty and established five technology cores that serve the whole campus. The five service cores are DNA Technologies, Expression Analysis, Proteomics, Metabolomics, and Bioinformatics. These technology service cores have been established to provide researchers with access to the latest technologies on an at-cost, as-needed basis. Further details are available from the website.

## Health Sciences Research Laboratory—Animal Surgery

Buildings H and J; Center for Laboratory Animal Science  
 530-752-7756; [latalken@ucdavis.edu](mailto:latalken@ucdavis.edu), [wtferrier@ucdavis.edu](mailto:wtferrier@ucdavis.edu)

This unit is a surgical research facility in compliance with NIH, AAALAC and USDA standards. Instruction in surgical techniques is available including multiple training stations for larger groups. Surgical instruments, drapes, anesthesia machines, scrub suits, and equipment for monitoring vital signs and physiologic parameters are available. Assistance with animal procurement is available. Staff are available to perform or assist with both survival and non-survival surgical procedures depending on the investigator's requirements. Staff are also available for post-operative care, data and sample collection as required, and assistance with preparation of the IACUC Protocol for Animal Care and Use.

## Human Performance Laboratory

164 Hickey Gym  
 530-752-0965

The Human Performance Laboratory (HPL) was founded in 1963 and has a long history of basic and applied research and outreach in exercise physiology, biomechanics and sports psychology. The HPL has been involved in a variety of research areas since its

inception including metabolism, heat stress, fluid balance, injury prevention, body composition and health benefits of physical activity and fitness. The HPL is represented by full-time and adjunct faculty members with varying research backgrounds and scientific interests. The HPL facilities allow measurement of a comprehensive list of human performance characteristics. Investigators have access to advanced data acquisition systems for evaluation in the areas of biomechanics, motor learning, environmental physiology, cardiopulmonary and thermoregulatory physiology, human nutrition and exercise and muscle metabolism. Specific technologies and capabilities include extensive computing facilities, high speed 3-D video motion analysis, ground reaction force measurement, ultrasound imaging, a temperature and humidity controlled environmental chamber and systems for measurement of oxygen consumption, body composition and psychomotor performance. The HPL meets the needs of today's creative researcher and has the capacity to assist in answering tomorrow's research questions.

## Humanities Institute

David Biale, Director

Molly McCarthy, Associate Director  
 227 Voorhies Hall 530-752-1254; Fax 530-752-4263

The UC Davis Humanities Institute (DHI) is an interdisciplinary research center that fosters intellectual collaborations and facilitates access to resources for faculty and graduate students who are actively engaged in research and teaching in the humanities, the arts, cultural studies and the humanistically oriented social sciences. It advocates for the humanities within the UC Davis community and works with funding agencies to secure individual and programmatic resources for faculty. To explore emerging research areas and provide collaborative opportunities for faculty and graduate students, the Institute sponsors faculty and graduate research fellowships, interdisciplinary research clusters, and administers the Mellon Research Initiatives in the Humanities and the Mellon Public Scholars Program. The Institute also organizes conferences, workshops and lectures and provides partial funding for events that serve humanities scholars at UC Davis.

## Mann Laboratory

105 Mann Laboratory

Trevor Suslow, Faculty Contact

Lee Ann Richmond, Facility Manager and Safety Officer  
 530-754-8313; Fax 530-752-4554

Plant scientists in the Louis K. Mann Laboratory study the physiology, biochemistry, microbiology and molecular biology of pre-harvest and harvested fruits, ornamentals, and vegetables to improve and maintain their quality and safety during harvest, storage, processing, distribution and marketing. Four current faculty and two Emeritus Faculty are located or affiliated with this facility and are members of the Department of Plant Sciences. One USDA/ARS research scientist is also housed in the Mann Lab. Research and extension activities are supported by students, postdoctoral researchers and visiting scientists. Research includes basic plant molecular biology, plant physiology, applied postharvest biology and technology, produce safety microbiology, and practical storage technologies for horticultural crops, including whole and lightly processed products. Results are of interest to other researchers in the plant sciences and food science as well as to growers, shippers, transportation and logistics providers, marketers and consumers of fresh fruit and vegetables. This Special Postharvest Facility is a CAES resource and is equipped with 18 controlled-temperature

rooms, eight research laboratories, specialized postharvest analytical equipment, advanced rapid test equipment for human pathogens, and a small conference room for up to 25 with a 60" wall-mounted flat-screen monitor.

## Natural Reserve System

John Wingfield, Director  
 Virginia Boucher, Associate Director  
 The Barn  
 530-754-7990;  
<http://nrs.ucdavis.edu>; <http://nrs.ucop.edu>

The UC Davis campus administers five reserves that are available for teaching and research.

- Bodega Marine Reserve, located at Bodega Bay, 100 miles west of campus, consists of both terrestrial and coastal marine habitats including grasslands, dunes, freshwater and brackish marshes, mudflats, sandy beaches, rocky intertidal and subtidal areas. There are facilities for overnight and longer stays.
- Jepson Prairie Reserve, located in Solano County 13 miles south of Dixon, consists of native California bunchgrass grasslands, vernal pools, playa lakes and freshwater sloughs.
- Donald and Sylvia McLaughlin Reserve, located near Clear Lake about 70 miles northwest of campus, consists of Inner Coast Range habitat with a mix of serpentine and non-serpentine soils. The reserve has a facility for overnight and longer stays and a camping area for class groups.
- Quail Ridge Reserve consists of Inner Coast Range habitat located about 30 miles west of campus on a peninsula jutting into Lake Berryessa. The reserve has facilities for overnight and longer stays and tent cabins for class groups.
- Stebbins Cold Canyon Reserve, located about 24 miles west of campus, has representative populations of several different plant communities found in California's Inner and Outer Coast Ranges. A five mile loop trail is popular with recreational hikers.

The University of California maintains 39 reserves throughout the state, many of which are available for teaching and research.

## Nuclear Magnetic Resonance Facility

Medical Sciences 1D  
 530-752-7677;  
<http://www.nmr.ucdavis.edu>

The Nuclear Magnetic Resonance Facility provides access to state-of-the-art NMR instrumentation for spectroscopy and imaging to researchers in the biological, medical and physical sciences. At present, the facility operates ten spectrometers of varying purposes and capabilities at field strengths from 300 to 800 MHz. Applications include structural characterization of organic molecules, determination of protein structure and dynamics, metabolomics, imaging and *in vivo* spectroscopy of small animals, plants, and materials, and spectroscopy of solids. The Facility also has workstations for off-line data processing. Three full-time staff members are available to assist campus researchers in utilizing the instrumentation. A training course, Biological Chemistry 230, is offered in the fall quarter.

## UC Pavement Research Center

2001 Ghausi Hall;  
 530-754-6409  
 John Harvey, Director, UC Davis Site; [jtharvey@ucdavis.edu](mailto:jtharvey@ucdavis.edu)  
<http://www.ucprc.ucdavis.edu>

The UC Pavement Research Center (UCPRC) uses innovative research and sound engineering principles to improve pavement structures, materials and technologies. Work at the UCPRC focuses on asphalt and concrete pavements, including design, materials, rehabilitation, life cycle, maintenance and reconstruction; pavement cost analysis and strategy selection; the effects of pavement activities on traffic in urban areas; pavement performance modeling; and environmental life-cycle assessment for pavements.

## Social Science Data Service

105 Social Sciences and Humanities Building  
 530-752-4009; <http://www.ssds.ucdavis.edu>

The Social Science Data Service (SSDS) is a unit in the Division of Social Sciences. SSDS provides quantitative computing and consulting services in support of faculty and graduate students involved in social science research on the UC Davis campus. SSDS provides consulting services for the wide range of software used by social scientists and assists with questions regarding the use of SSDS computers and statistical and data-related programming. SSDS manages a UNIX system and a PC research lab used for quantitative social science computing.

## Sustainable Transportation Energy Pathways (STEPS)

Institute of Transportation Studies, UC Davis  
 Joan Ogden, Director; [jmogden@ucdavis.edu](mailto:jmogden@ucdavis.edu)  
 Paul Gruber, Manager; [pwgruber@ucdavis.edu](mailto:pwgruber@ucdavis.edu)  
<http://steps.ucdavis.edu>

STEPS is an ongoing research consortium, started in 2007, that addresses the technical, operational, logistical, and strategic issues related to the transition to an alternative fuel-based economy. The program comprises 100+ interdisciplinary research projects addressing the potential transportation energy pathways: electricity, hydrogen, biofuels, and fossil fuels. These pathways are analyzed and compared across program threads: consumer demand and travel behavior; innovation and business strategy; infrastructure system analysis; environmental, energy and cost analysis; vehicle technology evaluation; policy analysis; and integrative scenarios and transition strategies.

The overarching program goal of STEPS is to generate new insights about the transitions to a sustainable transportation energy future and disseminate that knowledge to decision-makers in the private sector and governmental agencies so that they can make informed technology, investment, and policy choices.

## Tahoe Environmental Research Center (TERC)

UC Davis Administration Office; Watershed Sciences Building;  
 530-754-8372  
 TERC site Laboratories in Incline Village, NV 775-881-7560  
 Geoffrey Schladow, Director; [gschladow@ucdavis.edu](mailto:gschladow@ucdavis.edu)  
<http://terc.ucdavis.edu>/

The Tahoe Environmental Research Center is dedicated to research, education and public outreach on lakes and their surrounding watersheds and airsheds. Lake ecosystems include the physical, biogeochemical and human environments, along with

the interactions among them. The Center is committed to providing objective scientific information for the restoration and sustainable use of the Lake Tahoe Basin and for freshwater ecosystems worldwide. Two public education centers in the Tahoe basin provide information and organize programs for K-12 and adult audiences throughout the year.

## **UC Agricultural Issues Center**

252 Hunt Hall;  
530-752-2320; [agissues@ucdavis.edu](mailto:agissues@ucdavis.edu)  
<http://www.aic.ucdavis.edu>

The UC Agricultural Issues Center is a university-wide research and outreach unit with core competencies in economics while drawing on expertise from many disciplines. The Center focuses on California's agricultural issues related to science and technology, international trade and markets, agribusiness trends, rural-urban issues, natural resources and the environment, human resources and agricultural policy.

## **UC Davis Center for Plant Diversity**

Formerly the UC Davis Herbarium  
Dr. Dan Potter, Director; Ellen Dean, Curator  
1026 Sciences Laboratory Building, Department of Plant Sciences  
530-752-1091; <http://herbarium.ucdavis.edu>

The UC Davis Center for Plant Diversity provides information on the names, uses, toxicity and distribution of plants. Anyone can visit the Herbarium to use its dried plant collections (300,000 specimens), botanical library and microscopes, but a phone call is suggested to make sure staff will be available to assist you. The collections are used most commonly to check plant identifications, but they are also used by campus faculty and students for teaching and research in plant systematics and ecology. Herbarium staff answer hundreds of public service requests each year (especially identification of weeds and poisonous plants). Collections include vascular plants, bryophytes, lichens and algae. The majority of these specimens are angiosperms (flowering plants), mainly from California, but the collections are worldwide in scope, with strong holdings from North America, Ecuador, Baja California and regions with Mediterranean climate regimes. The Herbarium is well known for its collection of weeds and poisonous plants, although it also has world-class collections of grasses, oaks and spurge. The Herbarium's support group, the Davis Botanical Society, hosts a wide range of botanical events, workshops and trips each year.

## **UC Davis Energy Institute**

West Village, 1605 Tilia St, Suite 100; 530-752-4909  
Dan Sperling, Director; [energy@ucdavis.edu](mailto:energy@ucdavis.edu)  
<http://energy.ucdavis.edu>

The Energy Institute at UC Davis is home to energy research and education programs of the University of California, Davis. It was established to accelerate the global transformation to a sustainable energy future and is structured to coordinate the world-class strengths of UC Davis in energy research, education and outreach to foster new innovations, expand public service and inform decision-making about new energy solutions. The Energy Institute encompasses critical areas of energy research at UC Davis—

including renewable and sustainable energy systems, energy efficiency, fuels and transportation, infrastructure, environment, and economics. The Institute actively targets the demand for well-trained energy professionals.

## **UC Davis J. Amorocho Hydraulics Laboratory (JAHL)**

Dept. of Civil and Environmental Engineering;  
530-752-2385  
M. Levent Kavvas, Director; [mlkavvas@ucdavis.edu](mailto:mlkavvas@ucdavis.edu)  
Kara J. Carr, Co-Manager; [kjcarr@ucdavis.edu](mailto:kjcarr@ucdavis.edu)  
Ali Ercan, Co-Manager; [aercan@ucdavis.edu](mailto:aercan@ucdavis.edu)  
<http://jahl.engr.ucdavis.edu>

The research areas at the UC Davis J. Amorocho Hydraulics Laboratory include engineering hydraulics, fisheries protection, and ecological and environmental hydraulics. UC Davis JAHL was built to perform hydraulic modeling studies for the California State Water Project and has been conducting hydraulic investigations through scaled physical, prototype and numerical models to provide modeling services to federal, state, and local water agencies and private entities. With the recently constructed large flume, which has a circulation capacity of 200 cfs, it is now possible to perform prototype physical modeling studies at the laboratory, including dam removal and sediment transport studies without scaling the sediment and fluid properties. Recent research projects have included the assessment of hydraulics, fish behavior, and swimming, near unscreened diversions; studies of sturgeon passage; and investigations of the effects of California riparian vegetation on flow, roughness, and erosion. With the help of the state and federal agencies, researchers have actively participated in the development of solutions to fish protection for the Bay Delta river system and are developing a better understanding of the hydraulic and biological issues in the Sacramento River and Bay Delta system. Fish biologists, hydraulic engineers and other UC Davis JAHL researchers have many years of experience in testing Sacramento River and Bay Delta fish species under various hydraulic and environmental conditions and in handling invasive water plant species that occur in the Delta fish facilities.

## **X-Ray Crystallographic Laboratory**

James C. Fettinger, Ph.D.  
Department of Chemistry  
530-754-7822

The X-Ray Crystallographic Laboratory, located in the Department of Chemistry, provides crystal structure determinations for researchers. Single crystals from all branches of chemistry are studied. The laboratory is equipped with three single crystal Bruker X-ray diffractometers, a Kappa Photon 4-circle with both Cu and Mo micro-sources, an APEX Duo equipped with both a Cu micro-source and Mo sealed tube anode sources, and an APEXII Mo source system. The lab also has a Bruker Eco Advance Powder X-ray diffractometer with 9 position sample changer. The laboratory also possesses a stereo-microscope. All single crystal instruments have variable low temperature systems including one with the added capability of cooling the crystal to 5K. Consultation and collaboration on a variety of single crystal related projects can be arranged.

### Average Yearly Salary Offered to Graduates With Bachelor's, Master's, and Doctorate Degrees<sup>1</sup>

Field of Study:	Bachelor's	Average Yearly Salary	Master's	Doctorate
Engineering	\$62,564		\$68,100	Not reported
Humanities/Social Sciences	\$38,045		\$49,100	Not reported
Health Sciences/Life Sciences	\$47,050		\$61,500	Not reported
Physical Sciences	\$45,400		\$57,950	Not reported

### Average Salaries by Discipline

#### Bachelor's Degree

Broad Category	2016 Average Salary	Responses
Engineering	\$64,891	499
Computer Science	\$61,321	205
Math & Sciences	\$55,087	83
Agriculture & Natural Resources	\$48,729	24
Social Sciences	\$46,585	69
Humanities	\$46,065	46

#### Master's Degree

Engineering	\$73,871	224
Computer Science	\$72,080	87
Business	\$71,663	221
Math & Sciences	\$67,891	38
Social Sciences	\$52,333	9

#### Doctorate Degree

Computer Science	\$101,324	17
Math & Sciences	\$98,693	16
Engineering	\$95,055	62

National Association of Colleges and Employers (NACE), Salary Survey–Winter 2016, <http://naceweb.org/uploadedFiles/Content/static-assets/downloads/executive-summary/2016-january-salary-survey-executive-summary.pdf>

<sup>1</sup>Source:2010-2013 National Salary Survey data provided by the National Association of Colleges and Employers.

## Proportion of UC Davis Graduates Finding Work in Their Fields of Choice

The percent of alumni whose full-time job is in the field of their choice is shown by field of study. Figures do not include the five percent of graduates who had not decided on a career field at the time of the survey.

### Field of Study<sup>1</sup>, Percentage finding work in field of choice

Agricultural Sciences, 80%	Humanities, Arts and Cultural Studies, 75%
Biological Sciences, 79%	Mathematical and Physical Sciences, 78%
Engineering, 86%	Social Sciences, 72%

#### Total 77%

<sup>1</sup>Source: AA 2015 survey of June 2010-14 graduates conducted by Budget & Institutional Analysis.

<sup>2</sup>Fields of Study are groups of related undergraduate majors as organized into UC Davis colleges or divisions.

## Retention Data and Graduation Rates at UC Davis

### Freshmen\*

Retention and graduation rates through Summer 2014 for all undergraduates entering UC Davis as freshmen.

Fall Quarter of Initial Enrollment:	Number of Students**	Percent Returned for Second Year	Percent Graduating in Four Years	Percent Graduating in Five Years	Percent Graduating in Six Years
1999	3789	91%	42%	75%	80%
2000	4290	91%	43%	76%	81%
2001	4360	91%	43%	74%	80%
2002	4613	91%	48%	77%	82%
2003	4737	91%	50%	75%	80%
2004	4259	91%	51%	78%	82%
2005	4374	90%	51%	77%	82%
2006	5504	90%	52%	77%	81%
2007	4950	90%	51%	76%	81%
2008	4967	92%	53%	79%	83%

### Transfer Students

Retention and graduation rates through Summer 2014 for all undergraduates transferring to UC Davis from California community colleges.

Fall Quarter of Initial Enrollment:	Number of Students**	Percent Returned for Second Year	Percent Graduating in Two Years	Percent Graduating in Three Years	Percent Graduating in Four Years
2001	1607	89%	40%	75%	83%
2002	1669	90%	46%	78%	84%
2003	1582	90%	47%	78%	83%
2004	1734	89%	48%	78%	85%
2005	1588	88%	53%	79%	84%
2006	1617	90%	49%	80%	85%
2007	1650	88%	48%	77%	84%
2008	1703	90%	49%	80%	86%
2009	1990	89%	48%	79%	85%
2010	2529	90%	50%	80%	85%

Retention is defined as enrollment at the third week census point of the fall term one year from initial fall term.

Graduation is defined as having received a degree from UC Davis (does not include students who transferred to another institution to complete their degree).

\* Retention and graduation tracking limited to students enrolled full-time in their initial term of enrollment.

\*\* Students excluded from these counts include those who are now deceased or participated in any of the following: Military Service, Foreign Service, Religious Mission.

Source: Budget & Institutional Analysis, UC Davis (February 10, 2016).



UNDERGRADUATE ADMISSIONS

## UNDERGRADUATE ADMISSIONS

Undergraduate Admissions  
 One Shields Avenue  
 University of California  
 Davis, CA 95616-8507  
 530-752-2971; Fax 530-752-3712  
<https://www.ucdavis.edu/admissions/undergraduate>

Visit our Welcome Center  
 550 Alumni Lane  
 Walk-in Advising: Monday-Friday, 8 a.m.-5 p.m. (PT); Saturday, 9 a.m.-3 p.m. (PT)

## APPLYING TO UC DAVIS

Apply for admission at <http://universityofcalifornia.edu/apply>.

The initial filing periods to apply for undergraduate admission and scholarships at UC Davis are:

Quarter	Initial Filing Period (prior year)
Fall	November 1-30
Winter*	July 1-31
Spring*	October 1-31

\*UC Davis is rarely open to applicants for winter and spring quarters.

For up-to-date details regarding winter and spring quarter admission, and tips on completing the UC application and writing your personal statement, see <https://www.ucdavis.edu/admissions/undergraduate/apply>.

After applying, transfer students are required to update their grades and course records online using the UC Transfer Academic Update (TAU). This ensures that campuses have current academic information. For details and deadlines, see <http://admission.universityofcalifornia.edu/how-to-apply/after-you-apply/update-transfer-application>.

## APPLICATION FEES

The domestic filing fee for each University of California campus is \$70. For international applicants, the filing fee is \$80 per campus.

Fee waivers are available to students who meet strict eligibility guidelines based on household size and family income. When you apply online, you can fill out the fee waiver form included with the online application. If, after review by UC staff, you are not eligible for a fee waiver, you will be billed for all application fees. For current information on application fees and waivers, see <http://admission.universityofcalifornia.edu/how-to-apply/application-fees>.

## ADMISSION AS A FRESHMAN

### UC Freshman Applicant Definition

The University of California defines a freshman applicant as one who is either currently enrolled in, or has graduated from, a high school and has not registered in a regular session at any collegiate-level institution since high school graduation. An applicant who has completed college courses while in high school or in a summer session immediately following high school graduation is considered a freshman applicant.

### UC Freshman Admission Requirements

To be considered for admission to UC Davis, freshman applicants must earn a high school diploma or equivalent\* and satisfy the fol-

lowing UC admission requirements:

1. Subject Requirement,
2. Scholarship Requirement, and
3. Examination Requirement

\* The University of California will accept the California High School Proficiency Examination or the General Education Development (GED) Certificate awarded by any state's Department of Education in lieu of a regular high school diploma. However, you must also meet all other university entrance requirements: subject, scholarship and examination.

#### 1. Subject Requirement: "a-g"

Subject requirement courses must be completed with a C grade or better and, for California residents, must be on your high school's UC-approved course list. See your school's UC-approved course list at . At least 11 of the 15 units (one unit equals one year of study) defined by the "a-g" requirements must be taken prior to your senior year.

- a. History/Social Science—2 years required
- b. English (or Language of Instruction)—4 years required
- c. Mathematics—3 years required; 4 years recommended
- d. Laboratory Science—2 years required; 3 years recommended
- e. Language other than English (LOTE)—2 years required; 3 years recommended
- f. Visual and Performing Arts (VPA)—1 year required
- g. College Preparatory Electives—1 year required

#### 2. Scholarship Requirement

The Scholarship Requirement is satisfied if you earn a GPA of 3.000 or higher. All courses must be completed with a C grade or higher. Out-of-state applicants must earn a GPA of 3.400 or higher in the 15 college-preparatory "a-g" courses with no grade lower than a C.

#### 3. Examination Requirement

Freshman applicants are required to take the:

- ACT With Writing

OR

- SAT Reasoning Test

Highest scores from one sitting will be used.

SAT Subject Tests are no longer required and UC Davis will consider SAT Subject Tests only if they benefit the applicant; some UC campuses recommend that applicants take certain SAT Subject Tests.

Applicants for fall must take the required test no later than December of the previous year—official scores must be received by the end of January. You are responsible for making sure that testing agencies send your scores to the University of California.

Make arrangements to take the required ACT Plus Writing exam with your high school or at the ACT website at <http://act.org>. The UC Davis ACT code is 0454. You may make arrangements to take the required SAT Reasoning Test or optional SAT Subject Tests through the College Board website at <http://collegeboard.org>. The UC Davis College Board code is 004834.

## UC Pathways for California Residents

For the highest-achieving California applicants, UC has two paths:

- Statewide Path.
- Local Path, also known as Eligibility in the Local Context (ELC).

Learn more at <http://admission.universityofcalifornia.edu/freshman/california-residents>.

## UC Freshman Admission Requirements for Out-of-State Applicants

For additional information, see  
<http://admission.universityofcalifornia.edu/freshman/out-of-state>.

## Campus Selection vs. UC Admission Requirements

The University of California, Davis is a highly selective public research university with a strong reputation around the world. To prepare for admission and the academic rigor necessary to be successful at our campus, make sure you meet or exceed the UC admission requirements. Simply meeting these requirements does not guarantee admission to UC Davis—applicants who are admitted typically exceed them by a considerable margin. The selection criteria that UC Davis considers as part of its comprehensive review process for each UC applicant are available at [http://admissions.ucdavis.edu/admission/freshmen/fr\\_selection\\_process.cfm](http://admissions.ucdavis.edu/admission/freshmen/fr_selection_process.cfm).

## Transfer Credit for College Courses

Freshman applicants taking UC-transferable college courses while in high school may receive transfer credit upon receipt of an official final college transcript.

## Advanced Placement (AP) Examinations

Transfer credit is granted for each College Board Advanced Placement (AP) examination completed with an official score of 3, 4 or 5. The credit will be part of the minimum 180 quarter units you need in order to receive a bachelor's degree. Credit from AP examinations may also be used to satisfy specific degree requirements.

To learn how many units you may receive for an AP examination, see [College Board Advanced Placement \(AP\) Examination Credit, on page 40](#)—under the column heading, *Credit Toward Degree*. How those units will be applied toward specific degree requirements in each college is explained for each exam category. Please note that the courses for which AP credit has been granted may not be used as a substitute for courses required as part of the UC Davis General Education Requirement; see [General Education Requirement, on page 107](#).

In general, you may not earn university credit for college courses or International Baccalaureate (IB) transfer credits that duplicate credits already earned through AP. There are, however, a few exceptions to this general rule. Since it is often difficult to know exactly which UC Davis course you should take when you have earned AP credit, you should speak with an academic adviser in your major department, dean's office, or the Biology Academic Success Center before selecting and enrolling in classes.

## A Guide for Students with Advanced Placement (AP) Credit for a UC Davis Course

In general, you may not earn university credit for college courses duplicating credit already earned through Advanced Placement (AP). However, there are a few exceptions to this general rule, as the chart indicates in [College Board Advanced Placement \(AP\) Examination Credit](#), on page 40 and summarized here.

If you have AP credit for the following UC Davis course:	Can you take the same course at UC Davis?
Art History (AHI) 1A, 1B, 1C	No
Art Studio (ART) 2	No
Biological Sciences (BIS) 10	No
Chemistry (CHE) 2A	Yes
Chemistry (CHE) 10	No
Economics (ECN) 1A, 1B	No
Engineering: Computer Science (ECS) 30	No
English (ENL) 3	No
Environmental Science and Policy (ESP) 10	No
French (FRE) 3, 21, 22	No
German (GER) 3, 20, 21	No
History (HIS) 4A, 4B	Yes
History (HIS) 4C	No
History (HIS) 17A, 17B	Yes
Italian (ITA) 5, 4, 3	No
Latin (LAT) 2	No
Mathematics (MAT) 12	No
Mathematics (MAT) 16A, 17A, 21A	Yes
Mathematics (MAT) 16B, 17B, 21B	Yes
Music (MUS) 3A, 10	No
Physics (PHY) 1A, 1B	No
Political Science (POL) 1, 2*	No
Psychology (PSC) 1	No
Spanish (SPA) 21, 22, 23, 24	No
Statistics (STA) 13	Yes
University Writing Program (UWP) 1	No

\* Effective with the May 2015 AP exam, no UC Davis course credit will be issued for Political Science (Pol) 1, 2.

**NOTE:** Courses for which AP credit has been granted may not be used as substitutes for courses required as part of the UC Davis General Education Requirement.

## International Baccalaureate (IB) Examinations

UC Davis recognizes the International Baccalaureate (IB) examinations for college credit. Higher Level examinations presented with official scores of 5, 6 or 7 receive 8 quarter units (5.3 semester units) of degree credit and, in specific instances, are deemed comparable to various lower-division courses. Students completing the International Baccalaureate (IB) diploma with a score of 30 or above will receive a maximum of 30 quarter units (20 semester units). The credit will apply toward the minimum 180 quarter units needed to receive a bachelor's degree.

## College Board Advanced Placement (AP) Examination Credit

COLLEGE <sup>5</sup>											
Examination <sup>1</sup>		Credit Toward Degree, Quarter Units		UC Transfer Admission Eligibility Area <sup>2</sup>		IGETC Area <sup>3</sup>		UC Davis Course Equivalencies		Comments	
Art History	5    8	UC-H	3A or 3B	Art History 1A, 1B, 1C	No	-	-	-	-	a	
Art History	4, 3    8	UC-H	3A or 3B	-	-	-	-	-	-	-	
Biology	5, 4, 3    8	UC-S	5B and 5C	Biological Sciences 10	No	-	-	-	-	b	
Chemistry	5    8	UC-S	5A and 5C	Chemistry 2A	Yes*	Consult with adviser	-	-	-	b	
Chemistry	4, 3    8	UC-S	5A and 5C	Chemistry 10	No	-	-	-	-	b	
Chinese Language and Culture	5, 4, 3    8	UC-H	3B and 6A	-	-	Consult with adviser	-	f	-	f	
Comparative Government and Politics	5, 4, 3    4	UC-B	4	*	-	-	-	-	-	-	
Computer Science A	5, 4, 3    2 *	-	-	-	-	-	-	-	-	b	
Computer Science AB	5, 4    4 *	-	-	Engineering Computer Science 30	No	Engineering Computer Science 40*	-	-	-	b	
Computer Science AB	3    4 *	-	-	-	-	-	-	-	e	b	
English Language and Composition	5, 4    8 *	UCE	1A	English 3, University Writing Program 1	No	-	-	d	c	d	
English Language and Composition	3    8 *	UCE	1A	-	-	-	-	-	-	-	
English literature and Composition	5, 4    8 *	UCE / H	1A or 3B	English 3, University Writing Program 1	No	-	-	d	c	d	
English literature and Composition	3    8 *	UCE / H	1A or 3B	-	-	-	-	-	-	-	
Environmental Science	5, 4, 3    4	UC-S	5A and 5C	Environmental Science and Policy 10	No	-	-	-	-	b	
European History	5, 4, 3    8	UCB/H	3B or 4	History 4B, 4C	4A, 4B; Yes; 4C; No	French 23 or consult with adviser	-	f	-	f	
French Language	5    8 *	UC-H	3B and 6A	French 22	No	-	-	f	-	f	
French Language	4    8 *	UC-H	3B and 6A	French 21	No	French 22	-	f	-	f	
French Language	3    8 *	UC-H	3B and 6A	French 3	No	French 21	-	f	-	f	
French Language and Culture	5    8 *	UC-H	3B and 6A	French 22	No	French 23 or consult with adviser	-	f	-	f	
French Language and Culture	4    8 *	UC-H	3B and 6A	French 21	No	French 22	-	f	-	f	

\* Although Chemistry 2A may be taken for full credit, students are strongly encouraged to enroll in the 2A/H, 2B/H, 2C/H sequence.

\* AP exams completed prior to May 2015 with scores of 3, 4 and 5 should receive course credit for Political Science 2. Effective with May 2015 AP exam, course credit for Political Science 2 will no longer be awarded for AP exam scores of 3, 4 and 5.

\* 4 transferable unit maximum for both computer science exams. Credit for Computer Science and Engineering 30 may fulfill prerequisite for Computer Science and Engineering 40 with instructor consent.

\* 4 transferable unit maximum for both computer science exams. Satisfies university Entry Level Writing Requirement.

\* 8 transferable unit maximum for all English exams. Satisfies university Entry Level Writing Requirement.

\* 8 transferable unit maximum for all English exams. Satisfies university Entry Level Writing Requirement.

\* 8 transferable unit maximum for all English exams. Satisfies university Entry Level Writing Requirement.

\* 8 transferable unit maximum for French Language and French Longue and Culture exams. Maximum credit awarded to the exam with the highest score.

\* 8 transferable unit maximum for French Language and French Longue and Culture exams. Maximum credit awarded to the exam with the highest score.

\* 8 transferable unit maximum for French Language and French Longue and Culture exams. Maximum credit awarded to the exam with the highest score.

**College Board Advanced Placement (AP) Examination Credit**

COLLEGE <sup>5</sup>									
Examination <sup>1</sup>	Score	Credit Toward Degree; Quarter Units	UC Transfer Admission Eligibility Area <sup>2</sup>	IGETC Area <sup>3</sup>	UC Davis Course Equivalencies	Duplicate Credit Allowance <sup>4</sup>	Continuing UC Davis Course	Comments	
French Language and Culture	3    8 *	UC-H	3B and 6A	French 3	No	French 21	-	f    f	
French Literature	5, 4, 3    8	UC-H	3B and 6A	Upper Division	No	French 100 or consult with adviser	-	f    f	
German Language	5    8 *	UC-H	3B and 6A	German 21	No	German 22 or consult with adviser	-	f    f	
German Language	4    8 *	UC-H	3B and 6A	German 20	No	German 21 or consult with adviser	-	f    f	
German Language	3    8 *	UC-H	3B and 6A	German 3	No	German 20 or consult with adviser	-	f    f	
German Language and Culture	5    8 *	UC-H	3B and 6A	German 21	No	German 22 or consult with adviser	-	f    f	
German Language and Culture	4    8 *	UC-H	3B and 6A	German 20	No	German 21 or consult with adviser	-	f    f	
German Language and Culture	3    8 *	UC-H	3B and 6A	German 3	No	German 20 or consult with adviser	-	f    f	
Human Geography	5, 4, 3    4	UC-B	4	-	-	-	-	-	
Italian Language and Culture	5    8	UC-H	3B and 6A	Italian 5	No	Italian 9 or consult with adviser	-	f    f	
Italian Language and Culture	4    8	UC-H	3B and 6A	Italian 4	No	Italian 5 or consult with adviser	-	f    f	
Italian Language and Culture	3    8	UC-H	3B and 6A	Italian 3	No	Italian 4 or consult with adviser	-	f    f	
Japanese Language and Culture	5, 4, 3    8	UC-H	3B and 6A	-	-	Consult with adviser	-	f    f	
Latin	5, 4, 3    8	UC-H	3B and 6A	Latin 2	No	Consult with Classics adviser	-	-	
Latin (Vergil)	5, 4, 3    4	UC-H	3B and 6A	Latin 2	No	Consult with Classics adviser	-	f    f	
Latin Literature	5, 4, 3    4	UC-H	3B and 6A	-	-	Consult with Classics adviser	-	f    f	
Macroeconomics	5, 4, 3    4 *	UC-M	2A	Mathematics 12, 16A, 17A, or 21A	Mathematics 16B, 17B or 21B	Economics 101	-	-	
Mathematics—Calculus AB	5, 4    4 *	UC-M	2A	Mathematics 12, 16A, 17A, or 21A	Mathematics 16A, 17A, or 21A	Mathematics 16A, 17A or 21A	-	b	
Mathematics—Calculus AB	3    4 *	UC-M	2A	-	-	Mathematics 16A, 17A or 21A	-	b	

\* 8 transferable unit maximum for all French Language and French Language and Culture exams. Maximum credit awarded to the exam with the highest score.

\* 8 transferable unit maximum for German Language and German Language and Culture exams. Maximum credit awarded to the exam with the highest score.

\* 8 transferable unit maximum for German Language and German Language and Culture exams. Maximum credit awarded to the exam with the highest score.

\* 8 transferable unit maximum for German Language and German Language and Culture exams. Maximum credit awarded to the exam with the highest score.

\* 8 transferable unit maximum for German Language and German Language and Culture exams. Maximum credit awarded to the exam with the highest score.

\* 8 transferable unit maximum for German Language and German Language and Culture exams. Maximum credit awarded to the exam with the highest score.

\* 8 transferable unit maximum for Italian Language (last offered May 2011) and Italian Language and Culture exams. Maximum credit awarded to the exam with the highest score.

\* 8 transferable unit maximum for Italian Language (last offered May 2011) and Italian Language and Culture exams. Maximum credit awarded to the exam with the highest score.

\* 8 transferable unit maximum for Italian Language (last offered May 2011) and Italian Language and Culture exams. Maximum credit awarded to the exam with the highest score.

\* 8 transferable unit maximum for all mathematics-calculus exams.

Students electing to register in Mathematics 12, 16A, 17A or 21A must take the math placement exam and receive a qualifying score, regardless of AP score. Details at math.ucdavis.edu/undergrad/math\_placement.

Students electing to register in Mathematics 12, 16A, 17A or 21A must take the math placement exam and receive a qualifying score, regardless of AP score. Details at math.ucdavis.edu/undergrad/math\_placement.

\* 8 transferable unit maximum for all mathematics-calculus exams.

**College Board Advanced Placement (AP) Examination Credit**

COLLEGE <sup>5</sup>									
		Credit Score	UC Transfer Degree, Quarter Units	UC Admission Eligibility Area <sup>2</sup>	IGETC Area <sup>3</sup>	UC Davis Equivalencies	Duplicate Credit Allowance <sup>4</sup>	Continuing UC Davis Course	Comments
Examination <sup>1</sup>									
Mathematics—Calculus BC <sup>^</sup>	5	8 *	UC:M	2A	Mathematics 12, No; 16A, 16B, 17A, 17B, 21A, 21A; Yes	Mathematics 16C, 17C or 21C	-	- b	Mathematics 16A, 16B, 17A, 17B, 21A or 21B equivalents may fulfill prerequisites for Mathematics 16B, 16C, 17C, 17B, 21B or 21C.
Mathematics—Calculus BC <sup>^</sup>	4, 3	8 *	UC:M	2A	Mathematics 12, No; 16A, 17A, or 21A	Mathematics 12; No; 16A, 17A, 21A; Yes	Mathematics 16B, 17B or 21B	-	Credit for Mathematics 16A, 17A or 21A equivalents may fulfill prerequisite for Mathematics 16B, 17B or 21B.
Microeconomics	5, 4, 3	4	UC:B	4	Economics 1A	No	Economics 100	-	Prior to the May 2016 AP exam, completion of AP Music Theory with a score of 3, 4 or 5 is awarded credit for Music 10.
Music Theory	5, 4, 3	8	UC:H	-	Music 3A	No	-	-	*8 transferable unit maximum for all physics exams.
Physics 1	5, 4	8 *	UC:S	5A and 5C	Physics 1A, 1B	No	-	-	*8 transferable unit maximum for all physics exams.
Physics 1	3	8 *	UC:S	5A and 5C	-	-	-	-	*8 transferable unit maximum for all physics exams.
Physics 2	5, 4	8 *	UC:S	5A and 5C	Physics 1A	No	-	-	*8 transferable unit maximum for all physics exams.
Physics 2	3	8 *	UC:S	5A and 5C	-	-	-	-	*8 transferable unit maximum for all physics exams.
Physics B	5, 4	8 *	UC:S	5A and 5C	Physics 1A, 1B	No	-	-	*8 transferable unit maximum for all physics exams. Physics B replaced by Physics 1 and 2 in 2014-15.
Physics B	3	8 *	UC:S	5A and 5C	-	-	-	-	*8 transferable unit maximum for all physics exams. Physics B replaced by Physics 1 and 2 in 2014-15.
Physics C1—Mechanics	5, 4	4 *	UC:S	5A and 5C	Physics 1A	No	-	-	*8 transferable unit maximum for all physics exams.
Physics C1—Mechanics	3	4 *	UC:S	5A and 5C	-	-	-	-	*8 transferable unit maximum for all physics exams.
Physics C1I—Electricity/Magnetism	5, 4	4 *	UC:S	5A and 5C	-	-	-	-	*8 transferable unit maximum for all physics exams.
Physics C1I—Electricity/Magnetism	3	4 *	UC:S	5A and 5C	-	-	-	-	*8 transferable unit maximum for all physics exams.
Psychology	5	4	UC:B	4	Psychology 1	No	-	-	-
Psychology	4, 3	4	UC:B	4	-	-	-	-	-
Spanish Language	5	8 *	UC:H	3B and 6A	Spanish 23	No	Spanish 24 or consult with adviser	-	*8 transferable unit maximum for Spanish Language and Spanish Language and Culture exams. Maximum credit awarded to the exam with the highest score.
Spanish Language	4	8 *	UC:H	3B and 6A	Spanish 22	No	Spanish 23 or consult with adviser	-	*8 transferable unit maximum for Spanish Language and Spanish Language and Culture exams. Maximum credit awarded to the exam with the highest score.
Spanish Language	3	8 *	UC:H	3B and 6A	Spanish 21	No	Spanish 22 or consult with adviser	-	*8 transferable unit maximum for Spanish Language and Spanish Language and Culture exams. Maximum credit awarded to the exam with the highest score.
Spanish Language and Culture	5	8 *	UC:H	3B and 6A	Spanish 23	No	Spanish 24 or consult with adviser	-	*8 transferable unit maximum for Spanish Language and Spanish Language and Culture exams. Maximum credit awarded to the exam with the highest score.
Spanish Language and Culture	4	8 *	UC:H	3B and 6A	Spanish 22	No	Spanish 23 or consult with adviser	-	*8 transferable unit maximum for Spanish Language and Spanish Language and Culture exams. Maximum credit awarded to the exam with the highest score.

## College Board Advanced Placement (AP) Examination Credit

COLLEGE <sup>5</sup>	Letters and Science						Comments	
	Examination <sup>1</sup>	Score	Credit Toward Degree, Quarter Units	UC Transfer Eligibility Area <sup>2</sup>	IGETC Area <sup>3</sup>	UC Davis Course Equivalencies	Duplicate Credit Allowance <sup>4</sup>	
Engineering	Spanish Language and Culture	3 8 *	UC:H	3B and 6A	Spanish 21	No	Spanish 22 or consult with adviser	- f - f
	Spanish Literature	5, 4 8 *	UC:H	3B and 6A	Spanish 24	No	Spanish 100 or consult with adviser	- f - f
Biological Sciences	Spanish Literature	3 8 *	UC:H	3B and 6A	Spanish 23	No	Spanish 24 or consult with adviser	- f - f
Agricultural and Environmental Sciences	Spanish Literature and Culture	5, 4 8 *	UC:H	3B and 6A	Spanish 24	No	Spanish 100 or consult with adviser	- f - f
	Spanish Literature and Culture	3 8 *	UC:H	3B and 6A	Spanish 23	No	Spanish 24 or consult with adviser	- f - f
	Statistics	5, 4 4	UC:M	2A	Statistics 13	Yes	-	- b
	Statistics	3 4	UC:M	2A	-	-	-	- b
	Studio Art [Drawing Portfolio]	5, 4 8 *	-	-	Art Studio 2	No	-	- a
	Studio Art [Drawing Portfolio]	3 8 *	-	-	-	-	-	- a
	Studio Art [2D Design Portfolio; 3-D Design Portfolio]	5, 4, 3 8 *	-	-	-	-	-	-
United States Government and Politics	United States History	5, 4, 3 8	UC:B/H	4	*	-	-	-
	World History	5, 4, 3 8	UC:B/H	3B or 4	History 17A, 17B	Yes	-	-
						-	-	-

**Note: This is not a comprehensive list. If your exam is not listed, credit will be determined in consultation with an adviser.**

- <sup>1</sup> Students who take the Calculus BC exam and earn a sub-score of 3 or higher on the Calculus AB portion will receive credit for the Calculus AB exam, even if they do not receive a score of 3 or higher on the BC exam. The Calculus BC/AB sub-score satisfies IGETC Area 2A.
- <sup>2</sup> Examinations
- <sup>3</sup> IGETC Area
- <sup>4</sup> Duplicate Credit Allowance for Coursework Exams

Last test administration for discontinued exams:  
 May 2009—Computer Science AB, French literature, Italian literature  
 May 2011—French language, German language, Italian language, Italian literature  
 May 2012—Spanish literature, Latin [Virgil]  
 May 2013—Spanish language  
 May 2014—Physics B

**2 UC Transfer Admission Eligibility Area**

- UC-B=Behavioral and Social Sciences, UC-E=English, UC-H=Humanities, UC-M=Math, UC-S=Biological and Physical Sciences
- UC-E: If English AP test score of 3, 4, 5 was achieved prior to completing any transferable English composition course(s), 8 quarter units of transfer credit are awarded for the AP exam, and one of two English Composition requirements [UC-E] satisfied. UC Davis articulates AP English Language and Composition, and English literature and Composition, with scores of 4 or 5 as UWPs 1 and English 3; therefore we will not allow transfer credit for any duplicated English courses.
- For details regarding IGETC certification, see your California community college adviser and Help Topics: IGETC at [www.assist.org](http://www.assist.org). Students with partial IGETC certification should contact their dean's office.

**3 IGETC Area**

- Each AP exam may be applied to one IGETC area as satisfying one course requirement, with the exception of language other than English [LOTE].
- There is no equivalent AP exam for the Area 1B—Critical Thinking/Composition requirement.
- For details regarding IGETC certification, see your California community college adviser and Help Topics: IGETC at [www.assist.org](http://www.assist.org). Students with partial IGETC certification should contact their dean's office.

**4 Duplicate Credit Allowance for Coursework Exams**

- The university does not generally award full credit for college courses that duplicate college credit already earned through AP exams, whether taken before or during enrollment at the university. Exceptions to this policy are indicated in this column. We encourage students who have AP credit to speak with an academic adviser in their major department, undergraduate advising in your college dean's office or Biology Academic Success Center to determine which courses will provide the greatest benefit.

**5 UC Davis College Area Requirements**

- a. Partially satisfies area (breadth) requirements for the A.B. degree.
- b. Allows 4 units of credit toward Natural Sciences credit or preparatory coursework for science majors in each Natural Sciences exam passed and 8 units of credit allowed for Mathematics BC and Physics B exams.
- c. Satisfies 4 lower-division units of the English Composition requirement.
- d. Satisfies first course toward English Composition requirement.
- e. Exam awards units toward the Unrestricted Electives requirement.
- f. Language exams, except any Latin exam, satisfy the foreign language requirement.

**UC Davis Pattern of General Education**

- Courses for which AP credit has been granted may not be used as a substitute for courses required as part of the UC Davis GE requirement: see Advanced Placement [AP] examinations on page 39 and page 49.

**International Baccalaureate (IB) Higher Level Examination Credit**

COLLEGE <sup>4</sup>										
				Credit Toward Degree; Quarter Units	Score	IGETC Area <sup>2</sup>	UC Davis Course Equivalencies	Duplicate Credit Allowance <sup>3</sup>	Continuing UC Davis Course	Comments
Examination <sup>1</sup>	IB Area									
Arabic A1	A1 [native language; see "English" below]	5, 6, 7	8	3B and 6A	-	-	-	-	Determined by dept. or major adviser	- - -
Arabic A: Language and literature	Language and Literature [Language A: Language and literature]	5, 6, 7	8	3B and 6A	-	-	-	-	Determined by dept. or major adviser	- - -
Arabic A: Literature	[Language A: Literature]	5, 6, 7	8	3B and 6A	-	-	-	-	Determined by dept. or major adviser	- - -
Arabic B	Language Acquisition [Language B] (native language; for English, see "English" below)	5, 6, 7	8	6A	-	-	-	-	Determined by dept. or major adviser	- - -
Biology	Sciences	5, 6, 7	8	3B w/o lab	Biological Sciences 10	No	-	-	-	f, g
Business and Management	Individuals and Societies	5, 6, 7	8	-	-	-	-	-	-	- - -
Chemistry	Sciences	5, 6	8	5A w/o lab	Chemistry 10	No	-	-	-	f, g
Chemistry	Sciences	7	8	5A w/o lab	Chemistry 2A	Yes	Determined by dept. or major adviser	-	-	Although Chemistry 2A may be taken for full credit, students strongly encouraged to enroll in the Chemistry 2A/H/BH sequence.
Chinese A1	A1 [native language; see "English" below]	5, 6, 7	8	3B and 6A	-	-	-	-	Determined by dept. or major adviser	- - -
Chinese A: Language and literature	Language and Literature [Language A: Language and literature]	5, 6, 7	8	3B and 6A	-	-	-	-	Determined by dept. or major adviser	- - -
Chinese A: Literature	[Language A: Literature]	5, 6, 7	8	3B and 6A	-	-	-	-	Determined by dept. or major adviser	- - -
Chinese B	Language Acquisition [Language B] (native language; for English, see "English" below)	5, 6, 7	8	6A	-	-	-	-	Determined by dept. or major adviser	- - -
Classical Greek	Language Acquisition [Classical Languages]	5, 6, 7	8	-	Greek 1, 2	Yes	Determined by dept. or major adviser	-	-	- - -
Computer Science	Sciences	5, 6, 7	8	-	-	-	-	-	-	f, g
Dance	Arts	5, 6, 7	8	-	-	-	-	-	-	- - -
Economics	Individuals and Societies	5, 6, 7	8	4	Economics 1A and 1B	No	Determined by dept. or major adviser	-	-	- - -
English A1	English	5, 6, 7	8	3B	English 3	No	Determined by dept. or major adviser	a	b - c	Satisfies the university Entry Level Writing Requirement
English A2	English	5, 6, 7	8	3B	-	-	-	-	-	- - -
English A: Language and literature	Language and Literature [Language A: Language and literature]	5, 6, 7	8	3B	English 3	No	Determined by dept. or major adviser	a	b - c	Satisfies the university Entry Level Writing Requirement
English A: Literature	[Language A: Literature]	5, 6, 7	8	3B	English 3	No	Determined by dept. or major adviser	a	b - c	A score of 6 or higher on the Standard Level (SL) English A: Language and literature exam also satisfies the university Entry Level Writing Requirement, though it does not result in any course credit.
English B	Language Acquisition [Language B]	5, 6, 7	8	-	-	-	-	-	-	- - -

**International Baccalaureate (IB) Higher Level Examination Credit**COLLEGE<sup>4</sup>

Examination <sup>1</sup>	IB Area	Score	Credit Toward Degree, Quarter Units	IGETC Area <sup>2</sup>	UC Davis Course Equivalencies	Duplicate Credit Allowance <sup>3</sup>	Continuing UC Davis Course	Comments
Film	Arts	5, 6, 7	8	—	—	—	—	—
French A1	A1 [native language; "English" above] for English see "English," above]	5, 6, 7	8	3B and 6A	French 21, 22, 23	No	Determined by dept. or major adviser	—
French A2	A2 [second language; "English" above] for English see "English," above]	5, 6, 7	8	3B and 6A	French 21, 22	No	Determined by dept. or major adviser	—
French A: Language and Literature	Language and literature [language A: Language and Literature]	5, 6, 7	8	3B and 6A	French 21, 22, 23	No	Determined by dept. or major adviser	—
French A: Literature	Language and Literature [language A: Literature]	5, 6, 7	8	3B and 6A	French 21, 22, 23	No	Determined by dept. or major adviser	—
French B	Language Acquisition [language B] [non-native language] for English, see "English" above]	5, 6, 7	8	6A	French 1, 2, 3	No	Determined by dept. or major adviser	—
Geography	Individuals and Societies	5, 6, 7	8	4	—	—	—	—
German A1	A1 [native language; "English" above] for English see "English," above]	5, 6, 7	8	3B and 6A	German 1, 2	No	Determined by dept. or major adviser	—
German A2	A2 [second language; "English" above] for English see "English," above]	5, 6, 7	8	3B and 6A	German 1, 2	No	Determined by dept. or major adviser	—
German A: Language and Literature	Language and literature [language A: Language and Literature]	5, 6, 7	8	3B and 6A	German 1, 2, 3	No	Determined by dept. or major adviser	—
German A: Literature	Language and Literature [language A: Literature]	5, 6, 7	8	3B and 6A	German 1, 2	No	Determined by dept. or major adviser	—
German B	Language Acquisition [language B] [non-native language] for English, see "English" above]	5, 6, 7	8	6A	German 1, 2	No	Determined by dept. or major adviser	—
History of Africa	Individuals and Societies [History]	5, 6, 7	8	3B or 4	History 15	Yes	Determined by dept. or major adviser	—
History of the Americas	Individuals and Societies [History]	5, 6, 7	8	3B or 4	History 17A, 17B	Yes	Determined by dept. or major adviser	—
History of Europe	Individuals and Societies [History]	5, 6, 7	8	3B or 4	History 4C	Yes	Determined by dept. or major adviser	—
History of Europe and the Islamic World	Individuals and Societies [History]	5, 6, 7	8	3B or 4	—	—	Determined by dept. or major adviser	—
History of the Middle East	Individuals and Societies [History]	5, 6, 7	8	3B or 4	—	—	Determined by dept. or major adviser	—
History of Southeast Asia and Oceania	Individuals and Societies [History]	5, 6, 7	8	3B or 4	—	—	Determined by dept. or major adviser	—
Italian A1	A1 [native language; "English" above]	5, 6, 7	8	3B and 6A	Italian 4, 5	No	Determined by dept. or major adviser	—
Italian A2	A2 [second language; "English" above] for English see "English," above]	5, 6, 7	8	3B and 6A	—	—	Determined by dept. or major adviser	—
Italian A: Language and Literature	Language and literature [language A: Language and Literature]	5, 6, 7	8	3B and 6A	Italian 9	No	Determined by dept. or major adviser	—
Italian A: Literature	Language and Literature [language A: Literature]	5, 6, 7	8	3B and 6A	Italian 4, 5	No	Determined by dept. or major adviser	—
Italian B	Language Acquisition [language B] [non-native language] for English, see "English" above]	5, 6, 7	8	6A	—	—	Determined by dept. or major adviser	—

***International Baccalaureate (IB) Higher Level Examination Credit***

COLLEGE <sup>4</sup>									
Examination <sup>1</sup>	IB Area	Credit Toward Degree; Quarter Units	Score	IGETC Area <sup>2</sup>	UC Davis Course Equivalencies	Duplicate Credit Allowance <sup>3</sup>	Continuing UC Davis Course	Comments	
Japanese A1	A1 [native language; "English" above] for English see "English"	5, 6, 7	8	3B and 6A	-	-	Determined by dept. or major adviser	-	
Japanese A1: Language and Literature	Language and Literature [language and literature]	5, 6, 7	8	3B and 6A	-	-	Determined by dept. or major adviser	-	
Japanese A1: Literature	Language and Literature [language A; literature]	5, 6, 7	8	3B and 6A	-	-	Determined by dept. or major adviser	-	
Japanese B	Language Acquisition [language B] (non-native language; for English, see "English" above)	5, 6, 7	8	6A	-	-	Determined by dept. or major adviser	-	
Latin	Language Acquisition [classical languages]	5, 6, 7	8	-	Latin 1, 2	Yes	Determined by dept. or major adviser	-	
Mathematics	Mathematics	6, 7	8	2A	Math 21A, 21B	No	Determined by dept. or major adviser	-	
Mathematics	Mathematics	5, 6, 7	8	2A	Math 17A, 17B	No	Determined by dept. or major adviser	-	
Mathematics	Mathematics	5, 6, 7	8	2A	Math 16A, 16B	No	Determined by dept. or major adviser	-	
Mathematics, Further	Mathematics	5, 6, 7	8	-	Math 22A, 25	No	Determined by dept. or major adviser	-	
Music	Arts	5, 6, 7	8	-	Music 10	Yes	Determined by dept. or major adviser	-	
Philosophy	Individuals and Societies	5, 6, 7	8	-	Philosophy 1	No	Determined by dept. or major adviser	-	
Physics	Sciences	5, 6, 7	8	5A w/o lab	Physics 1AB	No	Determined by dept. or major adviser	-	
Portuguese A1	A1 [native language; "English" above] for English see "English"	5, 6, 7	8	3B and 6A	-	-	-	-	
Portuguese A2	A2 [second language; "English" above] for English see "English"	5, 6, 7	8	3B and 6A	-	-	-	-	
Portuguese A: Languages and Literature	Language and Literature [language A; language and literature]	5, 6, 7	8	3B and 6A	-	-	-	-	
Portuguese B	Language and Literature [language A; literature]	5, 6, 7	8	3B and 6A	-	-	-	-	
Psychology	Individuals and Societies	5, 6, 7	8	4	Psychology 1	No	Determined by dept. or major adviser	d	
Social and Cultural Anthropology	Individuals and Societies	5, 6, 7	8	-	Anthropology 2	Yes	Determined by dept. or major adviser	-	
Spanish A1	A1 [native language; "English" above] for English see "English"	5, 6, 7	8	3B and 6A	Spanish 28	No	Determined by dept. or major adviser	d	
Spanish A2	A2 [second language; "English" above] for English see "English"	5, 6, 7	8	3B and 6A	-	-	-	-	
Spanish A: Language and Literature	Language and Literature [language A; language and literature]	5, 6, 7	8	3B and 6A	-	-	-	-	
Spanish A: Literature	Language and Literature [language A; literature]	5, 6, 7	8	3B and 6A	Spanish 28	No	Determined by dept. or major adviser	d	

*International Baccalaureate (IB) Higher Level Examination Credit*

Examination 1	IB Area	Score	Credit Toward Degrees, Quarter Units	IGETC Area 2	UC Davis Course Equivalencies	Duplicate Credit Allowance <sup>3</sup>	Continuing UC Davis Course	Comments
Spanish B	Language Acquisition (Language B) (non-native language; for English, see "English" above)	5, 6, 7 8	6A	-	-	-	-	-
Theatre Arts	Arts	5, 6, 7 8	3A	-	-	-	-	-
Visual Arts	Arts	5, 6, 7 8	-	-	-	-	-	-
IB Diploma	-	30+ pts.	30	-	-	-	-	-
Letters and Science						-	-	-
Engineering						-	-	-
Biological Sciences						-	-	-
Agricultural and Environmental Sciences						-	-	-

**Note:** This is not a comprehensive list. If your exam is not listed, credit will be determined in consultation with an adviser.

- 1 Examination

- Beginning in 2012, Language A1 exams were eliminated and three separate tracks formed—Language A: Language and literature, Language A: Literature, Language A: Literature and Performance [S1]. English A1 was first offered in 2012 and the name changed to English literature beginning in 2013.
  - All Language A2 exams were eliminated as of May 2012: English A2, German A2, French A2, Italian A2, Portuguese A2, Spanish A2.
  - History of Europe and History of the Islamic World are no longer offered; see History of Europe and the Islamic World, and History of Europe and the Middle East.
  - History of South Asia and the Middle East is no longer offered.

**2 | GETC Area** For details regarding IGETC certification, see your California community college's office or the Bixbyon Academic Success Center.

3 IUC Davis Course Equivalencies and Credit Allowance for Duplicate Coursework / [Events](#)

**UC Davis course equivalents and credit allowances for duplicate exams**

Students are advised that college courses taken before or after attending UC may duplicate AP, IB and/or A Level examinations. Additionally, exams may duplicate each other (for example, an AP or IB exam in the same subject area). If the student duplicates an exam with another exam of the same subject area or with a college course, we will award credit or once. Exceptions to this policy are indicated in this column. We encourage students who have IB credit to speak with an academic adviser in their major department, undergraduate advising in the college deans' office or an adviser in the Biology Academic Success Center to determine any restrictions and which courses will provide the greatest benefit.

<sup>4</sup> UC Davis College Area Requirements

- 2. Satisfies first half of English Composition requirement
  - 3. Satisfies 4 lower-division units of the English Composition requirement
  - 4. Satisfies first course toward English Composition requirement
  - 5. Foreign Language requirement (A.B. degree) satisfied by the following exams—
    - French A.1, A2, B; German A. A1, A2, B; Italian A. A1; Portuguese B;
    - Spanish A. Literature, A1
  - 6. Music exam partially satisfies Area [Breadth] requirement for A.B. degree
  - 7. Provides 4 units of credit toward Natural Sciences
  - 8. Credit or preparatory coursework awarded to science majors for each Natural Sciences exam passed, with the following exception: 8 units of credit allowed for Mathematics and Physics exams

HC Bayes Pattern of General Education

- Courses for which IB credit has been granted may not be used as a substitute for courses required as part of the UC Davis GE requirement; see International Baccalaureate (IB) Examinations on page 39 and page 42.

To learn how many units you may receive for an acceptable IB examination, see [International Baccalaureate \(IB\) Higher Level Examination Credit, on page 44](#)—under the column heading *Credit Toward Degree*. The chart also specifies which UC Davis lower-division course an IB examination is comparable to. Please note that the courses for which IB credit have been granted may not substitute courses required as part of the UC Davis General Education Requirement; see [General Education Requirement, on page 107](#).

In general, you may not earn university credit for college courses that duplicate credit earned through IB. There are, however, a few exceptions as the chart indicates in [International Baccalaureate \(IB\) Higher Level Examination Credit, on page 44](#). Similarly, students will not receive duplicate credit for comparable AP examinations if granted IB transfer credit. Each college may have special restrictions on the use of IB examinations. Please check with your dean's office, department adviser or the Biology Academic Success Center to determine any restriction in the use of IB examinations toward breadth requirements and lower-division major course requirements before selecting and enrolling in classes.

## ADMISSION AS A TRANSFER STUDENT

### UC Transfer Applicant Definition

The University of California defines a transfer applicant as a student who has been a registered student in a regular term at a college, university or in college-level extension classes since graduating from high school. Summer session attended immediately following high school graduation is excluded in this determination. If you are a transfer applicant, you may not disregard any of your college records and apply for admission as a freshman.

### Campus Selection and Priority

UC Davis gives highest priority to junior-level transfer applicants from California community colleges. To apply to majors in the Colleges of Biological Sciences, Engineering and Letters and Science, students must be junior-level applicants with a minimum of 90 quarter units (60 semester units) of UC-transferable coursework, including courses in progress or planned. In the College of Agricultural and Environmental Sciences, junior-level applicants will be given highest priority, but lower-division applicants may be considered if space allows.

Meeting transfer admission requirements for the University of California does not guarantee admission to UC Davis. Due to limited enrollment space, transfer applicants who are admitted generally well exceed UC admission criteria. Foremost is the applicant's academic performance and preparation for the selected college and major. To be competitive, you must maintain a GPA of 2.800 or higher. In some cases, personal characteristics, experiences and circumstances will also be considered.

Applications far exceed the number of spaces available in majors such as biotechnology, computer science, psychology, viticulture and enology and all majors in the Colleges of Biological Sciences and Engineering. Applicants must complete specific lower-division major preparation courses with a specific GPA in the major and an overall required GPA.

To view our selective majors and their specific requirements for admission, see <https://ucdavis.edu/admissions/undergraduate/transfer/selective-major-requirements>.

### UC Transfer Admission Requirements for California Residents

To be eligible for admission to UC as a junior transfer student, you must fulfill both of the following criteria:

1. Complete 90 quarter units (60 semester units) of UC-transferable credit with a minimum 2.400\* GPA. No more than 21 quarter units (14 semester units) may be taken Pass/No Pass.
2. Complete the following seven UC-transferable college courses, earning a grade of C or better in each course:
  - Two courses in English composition;
  - One course in mathematical concepts and quantitative reasoning;
  - Four courses chosen from at least two of these subject areas: arts and humanities, social and behavioral sciences, and physical and biological sciences.

Each course must be worth at least 4-5 quarter (3 semester) units. Completing the Intersegmental General Education Transfer Curriculum (IGETC) before transferring to UC may satisfy the required seven-course pattern for UC admission, depending on the courses you take. For more information, see <http://www.assist.org>.

\* Please note that meeting UC admission requirements does not guarantee admission to UC Davis. To be a competitive candidate for admission, you must have an overall GPA of 2.800 or higher.

### Alternatives for Satisfying UC Transfer Admission Requirements

If you were eligible for admission to UC when you graduated from high school—meaning you satisfied the subject, scholarship and examination requirement—or were identified by UC during your senior year as Eligible in the Local Context (ELC) and completed the Subject and Examination Requirements by your senior year, you are eligible to transfer with a minimum C (2.000)\* average in your UC-transferable college coursework.

If you met the Scholarship Requirement in high school, but did not satisfy the 15-course Subject Requirement, you must take UC-transferable college courses in the missing subjects, earn a C or better in each required course and maintain a 2.000 GPA to be eligible to transfer.

\*Please note that meeting UC admission requirements does not guarantee admission to UC Davis. To be a competitive candidate for admission, you must have an overall GPA of 2.800 or higher.

## UC Transfer Admission Requirements for Out-of-State Applicants

The UC transfer admission requirements for transfer applicants from out-of-state are very similar to those for California residents. Applicants must have a GPA of 2.800\* or higher in all UC-transferable college coursework.

\* Please note that meeting UC admission requirements does not guarantee admission to UC Davis. To be a competitive candidate for admission, you must have an overall GPA of 2.800 or higher.

## Transfer Credit

Coursework from other colleges and universities is considered UC-transferable if the applicant completed the course at an institution that is recognized by the University of California. In addition, the coursework must be comparable to courses and levels offered within the University of California.

A total of 105 quarter (70 semester) UC-transferable units toward a university degree may be earned for lower-division coursework completed at any institution or combination of institutions. Lower- or upper-division units earned at UC (Extension, summer, cross/concurrent, UC-EAP and regular academic year enrollment) are added to the maximum lower-division credit allowed and might put applicants at risk of being denied admission due to excessive units. For more information, see <http://admission.universityofcalifornia.edu/counselors/files/uc-transfer-maximum-limitation-policy-chart.pdf>. You can find information about transferable credit from California community colleges at <http://assist.org>. Only subject credit will be granted for courses taken in excess of this amount.

If, after applying UC lower-division unit limitations and exclusions, you have completed 120 quarter units (80 semester units) or more of UC-transferable units, your admission is subject to approval by the respective dean for majors in the Colleges of Agricultural and Environmental Sciences, Biological Sciences and College of Letters and Science.

## Advanced Placement (AP) Examinations

Transfer credit is granted for each College Board Advanced Placement (AP) examination completed with an official score of 3, 4 or 5. To learn more, see [Advanced Placement \(AP\) Examinations, on page 39](#).

## International Baccalaureate (IB) Examinations

UC Davis recognizes the International Baccalaureate (IB) examinations for college credit. Higher Level examinations presented with official scores of 5, 6 or 7 receive 8 quarter (5.3 semester) units of degree credit and in specific instances are deemed comparable to various lower-division courses. Students completing the International Baccalaureate (IB) diploma with a score of 30 or above will receive a maximum of 30 quarter units (20 semester units). The credit will apply toward the minimum 180 quarter units needed to receive a bachelor's degree. To learn more, see [International Baccalaureate \(IB\) Examinations, on page 39](#) and [International Baccalaureate \(IB\) Higher Level Examination Credit, on page 44](#).

## Limited Status

Students in limited status are those whose special achievements qualify them to take certain university courses toward a definite and limited objective.

Currently the Colleges of Agricultural and Environmental Sciences, Biological Sciences, Engineering and Letters and Science do not consider limited status applicants. As an alternative, you may wish to consider enrolling in our UC Davis Extension Open Campus program.

## Second Baccalaureate

Only the College of Engineering considers applications from students who already have a bachelor's degree. Second baccalaureate applications to the College of Engineering will only be considered if the applicant's first degree is not in engineering and if the lower division engineering selective major criteria has been completed at a California community college. You must submit the University of California undergraduate application for admission and scholarships, at <https://admissions.ucdavis.edu/apply/>, during the appropriate filing periods.

After your application receives a full evaluation for meeting college, UC and UC Davis selection and admission criteria, it will be reviewed by the dean of the college and the executive director for Undergraduate Admissions for admission consideration based on superior academic record, clear evidence of a change in objective, and enrollment space available in the applied major.

## UC Intercampus Transfer

If you are an undergraduate student who is currently or was previously registered at another UC campus and have not since registered at a non-UC institution, you may apply for transfer to the UC Davis campus. Filing dates, application, fees and admission and selection requirements are the same as those listed for new transfer applicants. Current UC students who wish to attend UC Davis as intercampus visitors and plan to return to their home UC campus should refer to the [Intercampus Visitor Program, on page 89](#).

## ADMISSION AS AN INTERNATIONAL STUDENT

International students and researchers from countries around the world are part of the UC Davis community. During the 2014 academic year, the campus community represented more than 100 countries, including 3,000+ international students and nearly 2,100 international scholars.

## International Freshman Applicants

Non-immigrants studying in the United States must meet the same requirements as domestic California and non-California residents. Students studying outside the United States must complete secondary school, earn superior marks in academic subjects, sit for the UC-required exam and may be required to demonstrate English proficiency. For more information, see <https://www.ucdavis.edu/admissions/undergraduate/international>.

## International Transfer Applicants

International students applying to transfer to UC Davis from California or U.S. colleges or universities are considered for admission using the same transfer admission criteria as domestic students. Applicants who have attended international colleges or a combination of international and domestic colleges and universities will be evaluated using courses and grades from both institutions.

Priority admission consideration is given to prospective California community college transfer students, including international students, who are prepared to begin their junior or third year of study. Coursework from other colleges and universities is considered UC-transferable if the applicant completed the course at an institution that is recognized by the University of California and when the coursework is comparable to courses offered within the University of California. For more information, see <https://www.ucdavis.edu/admissions/undergraduate/international>.

## Required International Academic Records

International students are responsible for providing UC Davis with official academic transcripts and/or certificates beginning with secondary school records. College and university records should indicate subjects taken; grades or marks earned; rank in class; number of academic terms per year; number of weeks in each academic term; and number of hours per week devoted to lecture and laboratory. Certifications must be provided for any university or government examinations the student has undertaken. Note: It is not possible to disregard any college or university coursework undertaken within the United States or abroad.

## English Proficiency

Applicants must demonstrate English proficiency if they have been studying in the United States for less than two years, English is not their native language, and/or the language of instruction prior to study in the United States was not English. Applicants may demonstrate proficiency in one of the following ways:

- Complete two UC-transferable college courses (3 semester or 4–5 quarter units each) in English composition with C grades or better at an accredited U.S. college or university.
- Achieve a minimum score of 550 on the paper-based Test of English as a Foreign Language (TOEFL) or 80 on the Internet-based TOEFL. For more information, see <http://toefl.org>.
- Achieve a minimum score of 7 (academic module) on the International English Language Testing System (IELTS).
- Achieve a minimum score of 560 on the Writing component of the SAT Reasoning Test.

## AFTER YOU APPLY FOR ADMISSION

A few weeks after you apply, the University of California will notify you that your application has been received and processed. UC Davis will also notify you once the application has been received at our campus. At this time, you can create a MyAdmissions account at <http://myadmissions.ucdavis.edu>, using your UC Davis Student ID. You will be able to use this secure website to check your application and admission status at the UC Davis campus.

Students admitted to UC Davis can use MyAdmissions to view upcoming events for admitted students, check deadlines and complete pre-enrollment tasks, review their financial aid and scholarship awards (MyAwards), submit a student housing application, register for orientation and accept our offer of admission. Admitted students who wish to officially accept our offer of admission must submit their Statement of Intent to Register (SIR) and complete all pre-enrollment tasks related to:

- MyAwards—Financial Aid Notice and Scholarships
- Student Housing
- Orientation (fall admits only)
- Statement of Legal Residence (SLR)
- High School Transcripts
- College/University Transcripts
- AP/IB Examination Results
- Test Scores
- Requests for I-20 or DS-2019
- International Records
- Accommodation for a Disability (if applicable)
- Health Insurance Requirement
- Hepatitis B Statement

After applying, transfer students are required to update their grades and course records using the online UC Transfer Academic Update (TAU) to ensure that the campuses have the most current academic information before making admission decisions. For details and deadlines, see <http://admission.universityofcalifornia.edu>.

## Required Academic Records for All Students

You must accurately report all examination scores, as well as high school and any college/university work undertaken within the United States or abroad.

If you are admitted to UC Davis, you are expected to arrange to have all of your official final transcripts sent to Undergraduate Admissions by deadlines indicated on MyAdmissions. You do not need to submit official transcripts before this time, unless requested. All students must provide official final:

- High school transcripts
- College transcripts

All students completing the following examinations will be required to submit official scores:

- Advanced Placement (AP)
- International Baccalaureate (IB)

International applicants will be required to submit official scores for the following examination:

- TOEFL  
OR
- IELTS

Freshman applicants are also required to submit official scores for the following examinations:

- ACT With Writing  
OR
- SAT Reasoning Test  
and
- SAT Subject Tests (if taken)

For more information regarding ACT, see <http://act.org>; the UC Davis ACT code is 0454. For more information regarding SAT, see <http://collegeboard.org>; UC Davis College Board code is 004834.

Submit official documents and test scores to:

Undergraduate Admissions  
University of California  
One Shields Avenue  
Davis, CA 95616-8507

## SPECIAL PROGRAMS

### Deferred Enrollment

The deferred enrollment program allows newly admitted undergraduate students to postpone their initial enrollment at UC Davis for up to one year. The purpose is to allow time to pursue other non-academic activities and opportunities that will assist students in clarifying their educational goals; e.g., travel, job opportunities, non-collegiate experience, time to resolve personal or medical problems. Students are not allowed to enroll in any coursework at another college or university during this time.

To be eligible for deferred enrollment, you must submit your Statement of Intent to Register (SIR) and deposit by the stated deadline, satisfy all university admission and entrance requirements and provide all official transcripts and examination scores. After submitting the SIR, you can browse our deferred enrollment FAQs and apply for deferred enrollment through the MyAdmissions website. You must also submit a \$70 processing fee within seven days of submitting your deferred enrollment application.



FEES, EXPENSES AND FINANCIAL AID

## FEES AND EXPENSES

Give careful consideration to the total financing of your university education. If you will need funds beyond those that you and your family can provide, you should apply for financial aid well in advance of enrollment. The deadlines for applying for financial aid (grants, loans, Work Study and scholarships) are listed on the following pages.

The most up-to-date student fee information is available at <http://budget.ucdavis.edu/studentfees>. Every student must pay the quarterly fees, and any amounts charged to the student account, in full by the fee payment deadline listed in the Fees and Billing calendar at <http://registrar.ucdavis.edu/calendar/>. A Deferred Payment Plan (DPP), which allows students to pay quarterly student and housing fees in three monthly installments, or semester fees in four monthly installments, is available.

### Course Materials and Services Fees

Students may be charged fees in some courses for the use, rental or consumption of materials, tools or equipment, or for the costs of materials or services necessary to provide a special supplemental educational experience. For example, course materials fees may cover the purchase of chemicals and glassware for a science laboratory or art supplies for an art studio class. They might also cover film rentals, field trips, or the purchase or rental of specific equipment. Courses that may be subject to the course materials fee are listed in the Class Schedule at <http://registrar.ucdavis.edu/faculty-staff/>.

### Part-Time Students

Students approved for enrollment on a part-time basis pay the same fees as full-time students, but pay only one-half of Tuition. Part-time nonresidents pay one-half of the Nonresident Supplemental Tuition. The Part-Time Petition should be submitted through the Office of the University Registrar's website at <http://registrar.ucdavis.edu/registration/part-time.cfm>. The petitions must be submitted on or before the 10th day of instruction for the term in which the reduction is to be applied.

### UC Employee-Student Fees

Reduced fees are available to UC career employees and certain UC retirees who are qualified for admission to the university. The employee-student must file a petition, the Employee-Student Reduced Fee Authorization Form, with the Office of the University Registrar in 3100 Dutton Hall for the reduction of fees. The form must be filed on or before the 10th day of instruction for the term in which the reduction is to be applied. Employee-students pay one-third of the full-time Registration Fee and one-third of the full-time Tuition. Employee-students also pay the Memorial Union Fee and the Student Facilities Safety Fee.

Employee students may enroll for up to nine units or three courses per quarter or semester, whichever is greater. The reduced fee program does not apply to courses taken in self-supporting degree programs at UC Davis. Information is in Personnel Policies for Staff Members (section 51) at <http://manuals.ucdavis.edu/spp/pps51.pdf>. Petitions are also available on the Office of the University Registrar's website at <https://registrar.ucdavis.edu/tuition/staff-reduced-fee.cfm>.

### Vehicle Parking Permit and Bicycle Licensing Fees

For parking permit information and rates please visit the TAPS website at <http://taps.ucdavis.edu> or call 530-752-8277.

A California State bicycle license sticker is required on all bicycles operated on campus (new license, \$10.00; renewals, \$5.00—both valid through December 31 of the second year after purchase). For more information, see TAPS at <http://taps.ucdavis.edu> or call 530-752-2453.

### Costs for a Year at UC Davis

Cost of living expenses are adjusted annually and fees are subject to change without notice. For the most recent Cost of Attendance figures, please refer to the Financial Aid and Scholarships Office's website for undergraduate or graduate and professional students at <http://financialaid.ucdavis.edu>.

### International Student Expenses

International students are responsible for all of their expenses while studying at UC Davis. The expenses include nonresident supplemental tuition, systemwide tuition and fees, campus-based fees, room and board, books and a modest amount for personal expenses. For the 2015-16 academic year, costs for international undergraduates living on campus were \$56,916. For the latest costs, see <http://financialaid.ucdavis.edu/undergraduate/cost.html>.

During the admission process, most international undergraduate students are required to complete the "Confidential Financial Statement" form certifying that support funds are available for nine months. It is very important that students have adequate, reliable and continuing financial support for the whole time they are here. After students arrive in the United States, it is extremely difficult to obtain additional funding. The university does not offer grants or financial aid to international undergraduate students.

It is extremely important that you arrive on campus with sufficient funds for the entire academic year to cover all fees, tuition and expenses such as room and board, health insurance, books, supplies, transportation and other miscellaneous expenses. Careful budgeting is essential for international students.

## Estimated Student Fees\*

The estimated quarterly fees for Fall, Winter and Spring the 2016-17 academic year fees are not yet available at the time of publication. For up-to-date fee information, see <http://budget.ucdavis.edu/studentfees/>. Unless otherwise noted, these are the estimated quarterly fees from the Fall, Winter and Spring the 2015-16 academic year. The tuition, fees, and charges posted here are estimates based on currently approved amounts. Actual tuition, fees, and charges are subject to change by the Regents of the University of California and could be affected by State funding reductions. Accordingly, final approved levels (and thus a student's final balance due) may differ from the amounts shown. Programs and courses may have fees that are not listed here, check with your adviser.

	Undergraduate		Graduate <sup>3</sup>		Law <sup>4</sup> (Semester)		Medicine <sup>5</sup> M.D.		Management <sup>6</sup> M.B.A.		Veterinary Medicine <sup>8</sup> (Semester)		Public Health <sup>9</sup> M.P.H.		Master of Preventive Veterinary Medicine <sup>5,9</sup> M.P.V.M.		Master of Public Health <sup>10</sup> M.S.		Betty Irene Moore School of Nursing <sup>10</sup> M.S.		Capital Area North Doctorate in Educational Leadership Ed.D.		Health Informatics M.S.			
Student Services Fee	\$340.00	\$340.00	\$340.00	\$340.00	\$510.00	\$340.00	\$340.00	\$340.00	\$340.00	\$510.00	\$5,610.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00		
Tuition	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00	\$3,740.00		
ASUCD Fee	\$35.00	\$35.00																								
CSA Fee																										
LSA Fee																										
Memorial Union Fee	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50	\$42.75	\$28.50	\$28.50	\$28.50	\$42.75	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50		
Facilities and Campus Enhancement Fee	\$137.40	\$137.40	\$137.40	\$137.40	\$137.40	\$137.40	\$137.40	\$137.40	\$137.40	\$137.40	\$137.40	\$137.40	\$137.40	\$137.40	\$137.40	\$137.40	\$137.40	\$137.40	\$137.40	\$137.40	\$137.40	\$137.40	\$137.40	\$137.40		
Legal Education Enhancement and Access Program Fee																										
Campus Expansion Initiative	\$182.94	\$182.94	\$182.94	\$182.94	\$64.21	\$91.74	\$64.21	\$64.21	\$64.21	\$96.31	\$64.21	\$64.21	\$64.21	\$64.21	\$64.21	\$64.21	\$64.21	\$64.21	\$64.21	\$64.21	\$64.21	\$64.21	\$64.21	\$64.21		
Student Services Maintenance Fee and Student Activities & Services Initiative Fee	\$114.62	\$114.62	\$114.62	\$114.62																						
Student Facilities Safety Fee	\$22.00	\$22.00	\$22.00	\$22.00																						
Student Health Services Fee	\$44.00	\$44.00	\$44.00	\$44.00																						
Unitrans	\$6.00	\$6.00	\$6.00	\$6.00																						
Professional Degree Supple- mental Tuition																										
Disability Insurance Fee <sup>1</sup>																										
Course Materials and Services Fee <sup>2</sup>																										
Total Full-Time Student Fees, CA Resident	\$4,650.46	\$4,388.11	\$4,388.11	\$4,388.11	\$23,669.34	\$9,669.86	\$12,571.11	\$15,623.15	\$8,169.00	\$7,797.00	\$2,472.00	\$1,962.00	\$3,343.00	\$1,470.00	\$2,204.00											
Nonresident Tuition <sup>8</sup>	\$8,226.00	\$5,034.00	\$6,123.00	\$4,082.00	\$4,082.00	\$6,123.00	\$4,082.00	\$6,123.00	\$4,082.00	\$4,082.00	\$4,082.00	\$4,082.00	\$4,082.00	\$4,082.00	\$4,082.00	\$4,082.00	\$4,082.00	\$4,082.00	\$4,082.00	\$4,082.00	\$4,082.00	\$4,082.00	\$4,082.00	\$4,082.00		
Total Full-Time Student Fees, Nonresident (Excludes Health Insurance)	\$12,886.46	\$9,422.11	\$28,295.34	\$13,751.86	\$16,653.11	\$21,746.15	\$11,099.11	\$10,587.11	\$11,813.11	\$9,940.11	\$10,674.11															
Total Part-Time Student, CA Resident	\$2,750.46	\$2,518.11																								
Total Part-Time Student, Nonresident (Excludes Health Insurance)	\$6,898.46	\$5,035.11																								
Health Insurance <sup>11</sup>	\$705.00	\$705.00	\$51,318.00	\$51,318.00	\$1,977.00	\$810.00	\$1,318.00	\$1,977.00	\$1,318.00	\$1,318.00	\$1,318.00	\$1,318.00	\$1,318.00	\$1,318.00	\$1,318.00	\$1,318.00	\$1,318.00	\$1,318.00	\$1,318.00	\$1,318.00	\$1,318.00	\$1,318.00	\$1,318.00	\$1,318.00		

\* All new Undergraduate, Graduate Academic, and Graduate Professional students admitted will be charged a one-time, life-time document fee of \$150.00. Graduate students in the strictly professional degrees (M.D., D.V.M., and M.B.A.) are excluded and will continue with pay-per-service charges. More information about the document fee is available at [https://registrars.ucdavis.edu/local\\_resources/docs/doc-fees/](https://registrars.ucdavis.edu/local_resources/docs/doc-fees/).

<sup>1</sup> The Disability Insurance Fee is assessed annually fall quarter at \$41.00. This fee applies only to medical students, not interns, residents or health science academics.

<sup>2</sup> A course materials and services fee may apply to some undergraduate and graduate courses; see <http://budget.ucdavis.edu/students/documents/course-materials-fee.pdf>.

<sup>3</sup> The fees above exclude students enrolled in self-supported degree programs. Students enrolled in self-supporting degree programs pay a program fee in lieu of the fees above. Fees for self-supporting programs are available at <http://budget.ucdavis.edu/students/fees/>.

<sup>4</sup> The Law School operates on the semester system. Nonresident Law students pay a Professional Degree Supplemental Tuition of \$15,594.00 per semester.

<sup>5</sup> Student in these programs must attend the summer quarter and pay fees the summer. For fee information, see <http://budget.ucdavis.edu/students/fees/current/index.html>.

<sup>6</sup> The fees above reflect fees for students in the Graduate School of Management (GSM) full-time MBA program. Graduate students in the GSM part-time MBA programs (Bay Area MBA and Sacramento MBA) and Master of Professional Accountancy (MPAc) programs are self-supporting programs and students pay a program fee in lieu of the fees above. For fee information, see <http://budget.ucdavis.edu/students/fees/current/index.html>.

<sup>7</sup> Full-time MBA students are only required to pay the quarterly course materials and services fee in their first year of instruction.

<sup>8</sup> School of Veterinary Medicine operates on the semester system. 4th year Veterinary Medicine D.V.M. students also attend during summer and pay fees the summer prior to their final academic year. For more fee information, see <http://budget.ucdavis.edu/students/fees/current/index.html>.

<sup>9</sup> Nonresident Master of Public Health students pay a Professional Degree Supplemental Tuition of \$2,629.00 per quarter and nonresident Master of Preventive Veterinary Medicine students pay a Professional Degree Supplemental Tuition of \$1,117.00 per quarter.

<sup>10</sup> The Betty Irene Moore School of Nursing at UC Davis offers a Nursing or Nurse Practitioner degree program. The students in this M.S. Nurse Practitioner track must attend the summer quarter and pay additional summer fees. For fee information, see <http://budget.ucdavis.edu/students/fees/current/index.html>.

<sup>11</sup> Undergraduate and Graduate students are automatically in the Student Health Insurance Plan (SHIP) unless they are able to prove comparable coverage under another insurance plan. For more information, see <http://shk.s.ucdavis.edu/insurance>.

## FEE REFUNDS

### Cancellation, Withdrawal and Fee Refunds

To cancel your registration before the first day of instruction or to withdraw from the university on or after the first day of instruction, you must submit a Cancellation/Withdrawal Form. If you do not submit a Cancellation/Withdrawal Form, you will be liable for tuition and student fees according to university policy (below). No exceptions will be made to this policy.

If you are enrolled in classes, you will be dropped from all of your courses automatically when the Cancellation/ Withdrawal Form is processed.

For students who pay fees and then cancel or withdraw with official approval before the end of any quarter, fees may be refunded according to the [Schedule of Refunds, on page 55](#).

The effective date for determining a refund of fees is the date you submit a Cancellation/Withdrawal Form with the Office of the University Registrar and it is presumed that no university services will be provided to you after that date. The percentage of tuition and student fees that may be refunded is determined by the number of calendar days (not school days) elapsed, beginning with the first day of instruction.

If you are enrolled but have not paid fees in full by the tenth day of instruction, you will be administratively withdrawn and fees for the first 10 days of instruction will be charged to your account.

### New Undergraduate Students

The nonrefundable \$100 deposit paid when you accepted admission and returned your Statement of Intent to Register (SIR) is withheld from tuition and the Schedule of Refunds is applied to the balance of tuition and student fees assessed.

Therefore, on or before the first day of instruction, tuition and student fees paid are refunded in full minus \$100. After the first day of instruction, the nonrefundable \$100 deposit is withheld from tuition and the Schedule of Refunds is applied to the balance of tuition and student fees assessed.

### All Continuing Students, Readmitted Students and New Graduate Students

*On or before the first day of instruction, registration fees are refunded in full minus a \$10 service charge for cancellation/withdrawal.*

*After the first day of instruction, the Schedule of Refunds is applied to tuition and student fees. The Schedule of Refunds does not apply to the Health Insurance Fee.*

### Planned Educational Leave Program (PELP)

The Schedule of Refunds also applies to students who participate in the Planned Educational Leave Program (PELP). Thus, for a full refund of tuition and student fees paid, you must file a completed approved PELP Form with the Office of the University Registrar before or on the first day of instruction; see [Leave of Absence: Planned Educational Leave Program \(PELP\), on page 96](#).

### Schedule of Refunds

The Schedule of Refunds, at <https://registrar.ucdavis.edu/registration/leave/refunds.cfm>, applies to all new, continuing and readmitted students who do not receive federal financial aid.\*

The Schedule of Refunds refers to calendar days—not school days—beginning with the first day of instruction. The number of days elapsed is determined from the date the completed Cancellation/Withdrawal Form, PELP Form, or Filing Fee Form (graduate students) is returned to the Office of the University Registrar. Percentages listed will be applied respectively to Tuition, Nonresident Supplemental Tuition, and all student fees except the Health Insurance Fee.

#### For students enrolled in a quarter terms:

Elapsed Calendar Days	Percentage of Fees Refunded
0–1	100% less \$10.00
2–7 days	90%
8–18 days	50%
19–35 days	25%
36 days and over	0%

#### For students enrolled in a semester terms:

Elapsed Calendar Days	Percentage of Fees Refunded
0–1	100% less \$10.00
2–11 days	90%
12–27 days	50%
28–53 days	25%
54 days and over	0%

\*New students who receive federal financial aid and withdraw during their first academic term may be refunded fees according to a Modified Fee Refund Schedule, available at the Financial Aid Office; see <http://financialaid.ucdavis.edu/consumer/r2t4.html>.

### UC Davis Student Health Insurance Plan (Davis SHIP) Coverage and Refund of Davis SHIP Fees

The University of California requires that all students have health insurance. To help students meet this requirement, UC Davis automatically enrolls all registered students in the UC Davis Student Health Insurance Plan (Davis SHIP). Fees for Davis SHIP coverage are automatically charged to the student's account each term along with registration fees for:

- Students who want to be enrolled in Davis SHIP, enrollment is automatic-no action is required.
- Students with comparable insurance, who do not want to be enrolled in Davis SHIP, must submit a Davis SHIP waiver application at <http://shcs.ucdavis.edu/insurance> by the published deadline; see the [Academic Calendar, on page 1](#). If a waiver is approved, Davis SHIP enrollment will be waived through the end of the academic year. An approved waiver is effective for the duration of the current academic year only. Waiver applications must be filed each academic year.

On campus medical and mental health care is available to all students at SHCS, even if Davis SHIP is waived.

More waiver information or information regarding benefits, eligibility, deadlines, or insurance coverage if your registration status changes, can be found at <http://shcs.ucdavis.edu/insurance> or by visiting the SHCS Insurance Services office at the Student Health & Wellness Center.

## RESIDENCE FOR TUITION INFORMATION

### Policy Governing Residence

The determination of residence for tuition purposes at the University of California is governed by the UC Residence Policy and Guidelines. Under the UC Residence Policy, adult students and parents must have the legal ability to establish a permanent domicile in the United States, meaning that you must be a U.S. citizen or permanent resident of the United States or hold a valid, qualifying nonimmigrant visa or legal status. There are particular rules that apply to the residence classification of minors and that establish exemptions. All UC Residence requirements must be met by the residence determination date (generally the first day of instruction) of the term for which a resident classification is sought. Documentary evidence may be required and all relevant indications will be considered in determining residence classifications.

You are cautioned that this summary is not a complete explanation of the regulations regarding residence. Please note that changes may be made in the residence requirements between the publication of this statement and the relevant residence determination date.

### Office of the General Counsel

Requirements for Resident Classification, Rules Applying to Minors and Exemptions from Nonresident Supplemental Tuition can be found published as the "UC Residence Policy and Guidelines" available at the Office of the General Counsel website.

Read the full text of UC Residence Policy-Residency Guidelines for Purposes of Tuition and Fees at <http://ucop.edu/residency/>.

### Nonresident Supplemental Tuition Fee for Nonresident Students

If you have not met all of the UC requirements for residency prior to the Residence Determination Date each term in which you propose to attend the University, you must pay Nonresident Supplemental Tuition in addition to all other fees.

### Resident Determination Process

California residence for tuition purposes is determined for each student under the UC Residence Policy and Guidelines based on information provided to a campus Residence Deputy on the Statement of Legal Residence. Additional information and documentation in support of your claim of resident status for tuition purposes may be requested as needed. Applicants and students are responsible for submitting ALL RELEVANT DOCUMENTATION AND INFORMATION to the campus Residence Deputy in support of their in-state residency request. Information or documents

requested but not made available to the Residence Deputy will NOT be considered or reviewed on appeal.

### Incorrect Classification

If you were incorrectly classified as a resident, you are subject to reclassification and to payment of all Nonresident Supplemental Tuition not paid. If you concealed information or furnished false information and were classified incorrectly as a result, you are also subject to University discipline. Resident students who become nonresidents must immediately notify the campus Residence Deputy.

### Appeals

Any student, following a final decision on their residence classification by the Residence Deputy may apply for an appeal with the Office of the General Counsel within 30 days of notification of the Residence Deputy's final decision so long as the appeal meets specific requirements. Disagreement with the residence determination alone is insufficient grounds for an appeal and will not be accepted.

All inquiries regarding the appeal process should be addressed to the Office of the General Counsel at [Residency.Appeal@ucop.edu](mailto:Residency.Appeal@ucop.edu).

### Petitions for Classification to Resident Status

Nonresident students may apply for a change of classification to resident status once all the requirements have been met. Petitions for Classification to Resident Status from continuing UC Davis students classified as nonresident for tuition purposes in a prior quarter must be filed during the filing period and no later than the published deadline for the term they wish to classify as a Resident. Deadline exceptions will only be made in the cases of a documented medical illness, death in the immediate family, or an administrative error on the part of the university. Petition supporting documents will not be accepted after the 12th day of instruction unless an extension has been granted by a Residence Deputy.

### Inquiries

Inquiries regarding residence requirements, determination, classification and recognized exceptions should be directed to Residence Deputy, Office of the University Registrar, One Shields Avenue, Davis, California 95616 or [residencedeputy@ucdavis.edu](mailto:residencedeputy@ucdavis.edu).

Inquiries regarding the UC Residence Policy and Guidelines or appeals, should be directed to Office of the General Counsel at [Residency.Appeal@ucop.edu](mailto:Residency.Appeal@ucop.edu).

RESIDENCE DEPUTIES ARE THE ONLY AUTHORIZED UNIVERSITY PERSONNEL TO PROVIDE INFORMATION REGARDING RESIDENCE REQUIREMENTS.

## FINANCIAL AID

Financial Aid and Scholarships  
1100 Dutton Hall  
530-752-2390 530-754-6073 (Hearing Impaired)  
<http://financialaid.ucdavis.edu>

The Financial Aid and Scholarships Office provides financial assistance in the form of grants, scholarships, loans, and work-study employment. To apply, undergraduates and graduate students are required to annually file the Free Application for Federal Student Aid (FAFSA), available at <http://www.fafsa.gov> or the California Dream Act Application at <http://dream.csac.ca.gov>.

**The priority-filing deadline is March 2 each year;** however, students are encouraged to apply even if the deadline has passed. Although state and university funding may be depleted, Federal Pell Grants and Direct Loans are available throughout the year for eligible applicants.

### UC Education Finance Policy for Undergraduates

UC Davis uses the University of California Education Financing Model to determine financial aid awards for undergraduates. The policy looks at four factors to choose the type and amount of aid for each student:

1. Cost of Attendance
2. Expected Family Contribution (EFC) as determined by the information on your application
3. Federal, State, and University grant eligibility
4. Undergraduate Self-Help and Loan Contribution, which is the amount that undergraduates are expected to contribute toward their cost of education at UC Davis

The Financial Aid and Scholarships Office can assist students with dependents or child care costs that exceed the standard student budgets.

Undergraduates with outstanding academic records are encouraged to apply for scholarships. For information about scholarship application process, see [Undergraduate Scholarships and Awards, on page 59](#).

### Graduate Student Funding

Graduate students and students in the professional schools at UC Davis (Medicine, Law, Veterinary Medicine and the School of Management) apply for financial aid by completing the Free Application for Federal Student Aid (FAFSA), available at <http://www.fafsa.gov> or the California Dream Act Application at <http://dream.csac.ca.gov>. Financial need is based on the information provided on your application. FAFSA applicants will receive a Student Aid Report (SAR) with the Student Contribution (SC) assigned by the federal processor, while Dream Act applicants will receive their SC from CSAC. The SC is subtracted from the UC Davis Cost of Attendance (for the student's graduate program) to determine need-based eligibility. Graduate scholarships, fellowships and teaching and research assistantships are administered through the Office of Graduate Studies.

### Satisfactory Academic Progress

Federal regulations require that undergraduate and graduate student financial aid recipients meet the published Standards

for Satisfactory Academic Progress (SAP) for Financial Aid concerning units and maximum quarters of attendance allowed to obtain a degree. A copy of our SAP standards is available at <http://financialaid.ucdavis.edu/consumer/sap/standards.html>. Review the policy in detail and discuss it with your academic adviser.

For more information, contact your respective Financial Aid Office at <http://financialaid.ucdavis.edu/contact.html>. Regulations and deadlines are subject to change.

### Types of Financial Aid

#### Grants

A grant is an award that does not have to be repaid as long as the student remains eligible. Whenever criteria and funding levels permit, a student's financial aid award includes grants.

**Federal Pell Grants.** All undergraduate financial aid applicants are required to apply for a Federal Pell Grant each year by filing the FAFSA. Recipients must be enrolled at full time to receive the full amount of awarded Pell Grant and must maintain good academic standing and make satisfactory academic progress. Eligibility is determined by the federal government according to a formula developed by the Department of Education and approved annually by Congress. The UC Davis electronic financial aid notice (MyAwards) informs the student of the Pell Grant award amount.

**Cal Grants.** All undergraduate financial aid applicants who are California residents are encouraged to apply for a Cal Grant by submitting the FAFSA or California Dream Act Application and a GPA Verification form before March 2. Cal Grants are awarded by the California Student Aid Commission (CSAC) and may be renewed each year for four years, see <http://www.csac.ca.gov>.

- **Cal Grant A Awards** are based on financial need and academic achievement and can be extended for one year for students entering a teaching credential program. Cal Grant A pays partial registration fees.
- **Cal Grant B Awards** are based on financial need and are for undergraduate students primarily from low-income backgrounds. Recipients are required to complete at least 12 units each quarter. Cal Grant B pays a quarterly stipend for living expenses for first-year students and a portion of the registration fees plus a quarterly stipend for living expenses for students in their second through fourth years.

Cal Grant A and B recipients who plan to enroll in a Teaching Credential Program (TCP) may be eligible to renew their Cal Grant award for an additional year. The additional year of payment is provided to students who are seeking an initial teaching credential and cannot be used for other graduate level courses of study.

**University Grants (UC Grant).** The university determines grant eligibility for undergraduates by subtracting a student and parent contribution, any federal or state resources the student receives, and a standard work and loan contribution from the cost of attendance. Any remaining eligibility would be funded with UC Grant. UC Grant funding for graduate students is awarded by the Office of Graduate Studies. Students in the professional schools and the School of Education are awarded grant by their academic departments.

## Loans

Financial aid almost always includes a long-term loan. Awards are dependent on available funding. Some loan fund sources do not receive allocations each year. Repayment of these loans (with the exception of Federal Direct PLUS loans) begins after graduation or withdrawal from school. Students are encouraged to work as much as possible (while remaining full-time students) and to develop modest personal budgets to keep final loan indebtedness within a manageable range.

**Health Profession Student Loans (HPSL)** are awarded to students in the School of Veterinary Medicine who demonstrate financial need. Parental income information is required for HPSL applicants regardless of age and dependency status.

- \$2,500 plus fees maximum
- 5% interest
- Repayment begins twelve months after receipt of the degree or withdrawal

### Federal Direct Subsidized and Unsubsidized Student Loans

**(Direct Loans)** are available through the Financial Aid Office. Subsidized loans are based on financial need and interest accrued while the student is in school is paid by the federal government. Unsubsidized loans are available to students regardless of income and assets, and there is no interest subsidy.

- Undergraduates may borrow up to annual maximums of \$3,500 subsidized plus \$2,000 unsubsidized = \$3,500 for freshmen, \$4,500 subsidized plus \$2,000 unsubsidized = \$6,500 for sophomore, and \$5,500 subsidized plus \$2,000 unsubsidized = \$7,500 for juniors and seniors, up to a maximum aggregate indebtedness of \$23,000 for subsidized loan and \$31,000 in combined subsidized and unsubsidized loan
- Independent undergraduates may borrow unsubsidized Direct Loans up to annual maximums of \$9,500 for freshmen, \$10,500 sophomores, and \$12,500 for juniors and seniors, up to a maximum aggregate amount of \$57,500, of which \$23,000 can consist of subsidized loans
- Graduate and professional students may borrow unsubsidized Direct Loans up to an annual maximum of \$20,500. Health professions students may borrow higher amounts dependent on the length of their academic year
- For the most current interest rates on Direct Loans, see <https://studentloans.gov>
- A minimal loan fee is charged on all Direct Loans, which varies by loan type. The fee is deducted proportionately from each disbursement
- For Direct Loans, repayment begins six months after graduation or withdrawal from school

**Federal Direct Parent Loans for Students (Direct PLUS)** are government-insured loans that are made to parents of dependent students.

- Direct PLUS loans are available up to the cost of education minus other financial aid received during the years if the dependent student is an undergraduate
- There is no interest subsidy for this loan
- A loan fee is charged and deducted proportionately from each disbursement
- For the most current interest rate and loan fee information, see <https://studentloans.gov>

- Repayment begins within 60 days after loan disbursement

**Direct Grad PLUS Loans.** The Grad PLUS Loan is provided by the William D. Ford Direct Loan Program.

- Credit checks are required to be eligible for the Grad PLUS. Students who do not meet the credit requirements for a Grad PLUS may still obtain the loan with an endorser who does meet the credit requirements
- An origination fee is deducted from the loan amount
- For the most current interest rate and loan fee information, see <https://studentloans.gov>
- Repayment period begins 60 days after loan disbursement

**Federal Perkins Loans** are for U.S. citizens or permanent U.S. residents. Loans may be limited to a percentage of student's need because of demand and limited funds. This is a subsidized loan, which means the federal government pays the interest on the loan while the student is enrolled in school. Repayment starts nine months after graduation or withdrawal from school and may be extended over 10 years. Additional deferments are possible for temporary total disability or volunteer service in a private, non-profit organization, VISTA or the Peace Corps. Some teachers of students from low-income families and full-time teachers of handicapped children may also qualify for partial loan cancellation.

#### Annual Federal Perkins Loan Limits

- \$4,000 for undergraduate students
- \$6,000 for graduate/professional students

#### Aggregate (Maximum) Loan Limits

- \$8,000 for a student who has not completed the first two years of undergraduate work and for programs that are less than two years in length
- \$20,000 for a student who has successfully completed two years of a program of education leading to a bachelor's degree but who has not completed degree work
- \$40,000 for a graduate/professional student (includes loans borrowed at the undergraduate level)

UC Davis offers many affordable university loan programs to its students. While a majority of campus-based loans have a need component as demonstrated by the FAFSA or Dream Act application, most students can apply for other loan opportunities such as the emergency, short-term and assistant loan program.

**Emergency, Short-Term and Assistant Loans** meet temporary or emergency financial needs of currently enrolled students. Please visit the financial aid website for requirements, instructions and the online application. Loan funds are provided by UC Davis alumni, ASUCD, the Cal Aggie Foundation, the Regents of the University of California and private donors.

- **Emergency Loans.** \$500 maximum. The maximum repayment period is 30 days
- **Short-Term or Assistant Loans.** \$501 or higher. Assistant Loans are available to graduate students who are in the teaching assistant, research assistant, readership, associate-instructor or post-graduate researcher classifications can apply for a maximum of one month's salary. The maximum repayment period for both loan types is six months or the end of the academic year, whichever occurs first

For applications and more information about applying, see <http://financialaid.ucdavis.edu/loans/short-term.html>.

## Work-Study

1100 Dutton Hall  
530-752-0520; [sec@ucdavis.edu](mailto:sec@ucdavis.edu)

### Undergraduate Work-Study

Work-Study allows students to earn part of their financial aid through part-time employment. Federal Work-Study is available for students eligible to complete the Free Application for Federal Student Aid Form (FAFSA), and the FAFSA must be completed by March 2 annually to be considered. Institutional Work-Study is available to international and AB 540 students who are eligible to work and is also based on need. For AB 540 students that are also undocumented, need is determined by the California Dream Act Application, which must be completed by March 2 annually to be considered. Dream Act applicants must also meet Deferred Action for Childhood Arrivals (DACA) requirements to be eligible. International and other AB 540 students must complete a separate application to be considered for Institutional Work-Study. Please see our office for details. Work-Study awards offer both money for education and work experience.

**Community Service.** A wide variety of community service jobs are available for students who apply for Work-Study funding. These jobs provide educational and rewarding work experience and help students connect with the community at large. Students applying for community service jobs also receive priority consideration for Work-Study funding.

### Work-Study for Graduate Students

Work-Study funds for graduate students are allocated directly to the chairpersons of the graduate programs. Graduate students seeking Work-Study funding should contact their respective departments for further information. Students must file a FAFSA or California Dream Act application and have financial need to be considered for Work-Study funding.

## Undergraduate Scholarships and Awards

Undergraduate and Prestigious Scholarships Office:  
2128 Dutton Hall  
530-752-2804; [scholarships@ucdavis.edu](mailto:scholarships@ucdavis.edu);  
<http://scholarships.ucdavis.edu/>

Mailing address:  
Undergraduate and Prestigious Scholarships Office  
University of California  
One Shields Avenue  
Davis, CA 95616-8696

UC Davis recognizes outstanding students with scholarships awarded on the basis of academic excellence and exceptional promise. The Scholarship Office administers approximately 220 different undergraduate scholarships. Many more scholarships are handled through outside agencies.

Committees made up of faculty and staff determine scholarship eligibility. In addition to academic records (a minimum grade point average of 3.250 is required), selection may be based on letters of recommendation, test scores and a personal essay in which your university goals and objectives are stated. Some awards are limited to students in specific majors or colleges, residents of certain geographical areas, students of a particular class standing, or students with demonstrated financial need. Most scholarships are not renewable and you must reapply each year for scholarship aid.

Students applying to the university are considered for scholarships using the same forms completed for admission purposes. The undergraduate scholarship application for continuing students becomes available online in October and is due in early January. See the Scholarship Office website for instructions and the application. Scholarship recipients will be notified beginning in April and continue through late summer.

**Regents Scholarships**, among the highest honors that undergraduates at the university can receive, are granted to exceptionally promising freshmen or juniors enrolling in the fall quarter. Awards may be honorary (honorarium) or may be accompanied by a stipend (for students demonstrating financial need), which generally covers the difference between family resources and yearly educational costs. These scholarships are renewable as long as students maintain a 3.250 cumulative grade point average.

- 2-year and 4-year renewable scholarships

**Prestigious Scholarships and Fellowships** are highly competitive, merit-based awards open to all UC Davis students. These awards have an extensive application process, and our office is available to assist you. Please visit the Undergraduate or Graduate Prestigious Scholarships & Fellowships section of our website for more details.

**Special Prizes** at UC Davis recognize outstanding performance, achievement and promise in special programs or majors. The most prestigious prize is the University Medal, presented to the most outstanding graduating senior.

- Plaques or certificates and cash awards
- College and school medals to outstanding graduates

**Alumni Scholarships** provided by the Alumni Association in cooperation with the university, are based primarily upon leadership and scholastic achievement. Your financial need and extracurricular activities may also be considered. For more information, see <http://alumni.ucdavis.edu/about-us/scholarships>.

- \$1,000 minimum
- New undergraduates only
- Selection by local alumni association chapters

**Military Scholarships** are awarded to outstanding high school seniors without regard to financial need, as well as to UC Davis students who have demonstrated exceptional leadership and scholastic achievement during their freshman and/or sophomore years. Eligible high school seniors apply for the full 4-year scholarship and must file applications by November. UC Davis scholarship students participate in the Military Science (ROTC) Program. Information and applications are available from the Department of Military Science in 125 Hickey Gymnasium 530-752-5211.

- Full fees, books and supplies
- \$1,000 per year for miscellaneous expenses
- 1-, 2-, 3- or 4-year scholarships

**Other Scholarships** are made possible by individual donors, private corporations and various agencies. Many organizations and groups conduct their own scholarship programs. In most cases, you apply directly to these sponsoring groups. Information on available outside scholarships and scholarship search services is available at <http://financialaid.ucdavis.edu/scholarships/outside.html>.

- Graduate students are also eligible for various scholarships and fellowships; see Fellowships, Assistantships and Loans, on page 122.



STUDENT LIFE

## STUDENT LIFE

As a UC Davis student, you are part of a diverse student community that fosters academic and career exploration as well as personal growth. The campus offers assistance with the practicalities of student life, such as finding housing, staying healthy and affording a university education. Faculty members, staff and peer advisers are available to support your academic goals by helping you master concepts, study effectively, manage time and apply classroom material to careers. Whatever your academic and career aspirations, you'll find opportunities to enrich your student experience through internships, research, community service, student clubs and study abroad. UC Davis students also enjoy myriad recreational choices, from impromptu Quidditch games on the Quad to intercollegiate athletics, craft classes, backpacking trips and more.

## LIVING AT DAVIS

### On-Campus Housing

Student Housing Office  
530-752-2033; [studenthousing@ucdavis.edu](mailto:studenthousing@ucdavis.edu); <http://housing.ucdavis.edu>

Living on campus adds a measure of convenience to your life and helps familiarize students with the campus. Over 9,000 students live in Student Housing each year, including over 94 percent of incoming freshman students.

All incoming fall quarter freshmen and transfer students are guaranteed housing in Student Housing, provided they meet eligibility requirements and all Student Housing and university deadlines. Freshmen and Transfer students are guaranteed one year of housing. See the Student Housing website for more information about the housing guarantee. All other students should contact Student Housing to inquire about their housing options.

### Residence Halls

There are many residence halls at UC Davis, located in three different Student Housing areas: Segundo, Tercero, and Cuarto. In each of the residence hall complexes, students and staff create and maintain an environment conducive to personal growth and educational achievement. Academic and social events are held many times throughout the year. An Academic Advising Center, a Computer Center, convenience store and a dining hall (dining commons) are located in each area.

Rooms are furnished with a bed and mattress, desk and chair, bookcase, chest of drawers, closet or wardrobe, study lamp, and wastebasket and recycling basket for each resident. Furnished common rooms in each residence hall are available for studying, relaxing and hanging out with friends.

Cost is based on room occupancy (single, double, or triple) and meal plan choice. Rates are available at <http://housing.ucdavis.edu/fees>. Each year's rates are subject to approval by the UC Regents, are typically finalized in May, and are effective for the following academic year.

Incoming first-year freshmen students are eligible to live in the residence halls. Some years, as space allows, incoming first-year transfer students may also live in the residence halls. Housing online applications will be available to incoming freshmen stu-

dents after they submit their Statement of Intent to Register (SIR). All other students are encouraged to call Student Housing to inquire about housing availability.

Students who require a special accommodation or consideration, including a medical condition, disability, dietary requirement or other circumstance will be able to submit their request and supporting documentation as a part of the residence hall application process.

Visit the Student Housing website to learn more about the residence halls and how and when to apply for housing. Call or email Student Housing with any questions.

### Apartments

There are several apartment properties on the UC Davis campus that provide housing to students with families, graduate and professional students, and undergraduate students. Multiple housing projects will bring many new apartments to the UC Davis campus with an emphasis on graduate students and students with families in the next two-three years.

### **Student Housing Apartments (SHA)—Transfer Student Communities**

Student Housing created a special community for transfer students called "Student Housing Apartments," or SHA. SHA is comprised of multiple apartment complexes both on and very close to campus. SHA residents have access to academic support and tutoring, as well as access to on-campus computer centers and optional dining plans.

Rooms are furnished with a bed and mattress, desk and chair, bookcase, chest of drawers, closet, study lamp, and wastebasket and recycling basket for each resident. Living and dining rooms are also furnished, and all apartments feature full kitchens.

Cost is based on room occupancy and meal plan choice. Rates are available at <http://housing.ucdavis.edu/fees>. Each year's rates are subject to approval by the UC Regents, are typically finalized in May, and are effective for the following academic year.

Incoming first-year transfer students are eligible to live in SHA. Housing online applications will be available to incoming transfer students after they submit their Statement of Intent to Register (SIR).

Students who require a special accommodation or consideration, including a medical condition, disability, dietary requirement or other circumstance will be able to submit their request and supporting documentation as a part of the Student Housing Apartments application process.

Visit the Student Housing website to learn more about SHA and how and when to apply for housing. Call or email Student Housing with any questions.

### **Solano Park Apartments**

Solano Park offers over 270 university-operated, unfurnished one- and two-bedroom apartments surrounded by green lawns and shade trees that create a serene family-friendly atmosphere. Priority is given to students with families, and then to graduate students, but all UC Davis students are eligible to live at Solano Park.

Students may submit an application to live at Solano Park before being admitted to UC Davis, and should apply for housing several months in advance to ensure housing is available. Solano Park rates are available at <http://housing.ucdavis.edu/fees>. Each year's rates are subject to approval by the UC Regents, are typically finalized in May, become available after approval, and are effective on August 1.

Students who require a special accommodation or consideration, including a medical condition, disability, dietary requirement or other circumstance will be able to submit their request and supporting documentation as a part of the application process.

Visit the Student Housing website to learn more about Solano Park Apartments and how and when to apply for housing. Call or email Student Housing with any questions.

### **8th & Wake Apartments**

8th & Wake is a new privately-owned and managed on-campus complex for graduate students. For more information, call 8th & Wake at 530-298-7777.

### **The Atriums at La Rue**

The Atriums offers studio and two-bedroom unfurnished units for single graduate students. The Atriums is a privately-owned and managed on-campus complex. For more information, call The Atriums at 530-753-7322.

### **Russell Park Apartments**

Russell Park offers one-, two-, and three-bedroom unfurnished units for students with families. Russell Park is a privately-owned and managed on-campus complex. For more information, call Russell Park at 530-753-7322.

### **West Village**

West Village is a neighborhood featuring three apartment complexes as well as a park, retail and dining space, a community college, and coming soon, single family homes. The apartment complexes offer housing for UC Davis students, as well as faculty and staff. West Village is a privately-owned and managed on-campus complex. For more information, call the West Village Leasing Center at 530-759-0661.

### **Cooperatives**

Cooperatives present unique and independent living opportunities to their residents. Communities share daily chores, including cooking, cleaning, and gardening, and host a variety of dinner parties and events. There are two Cooperatives at UC Davis: the Tri-Cooperatives and The Baggins End Domes, privately-owned and managed by SCHA.

For more information about the Tri-Cooperatives and Baggins End, see the Solar Community Housing Association website at <http://schadavis.org>.

### **Off-Campus Housing**

The majority of UC Davis students live off campus. The City of Davis has ample apartments for rent, from one-person studio apartments to five- or six-person suites. Townhouses, duplexes

and houses throughout the city are also available for student rental. ASUCD maintains a list of available community housing at <http://chl.ucdavis.edu>. And early every year ASUCD hosts "Housing Day," an event that brings dozens of local housing managers to campus to introduce their communities to UC Davis students.

## **TRANSPORTATION AND PARKING**

Transportation Services (TAPS)  
Located on North Dairy Road  
Office hours: M-F, 7:30 a.m.-4 p.m. (PT)  
Enforcement hours: 7 a.m.-10 p.m. (PT)  
530-752-8277; <http://taps.ucdavis.edu>  
Motorist Assistance Program: 530-752-8277  
Bicycle Program: 530-752-BIKE (2453)

The central campus is closed to unauthorized motor vehicles. Walking and bicycling are the most common ways to traverse the campus.

**Bicycles.** All bicycles ridden or parked on campus must have a current California state bicycle license. You may buy a license or renewal tag at TAPS. Bicycle traffic and parking regulations are strictly enforced. Bikes may be parked only in designated parking areas and may only be secured to bike racks. The Bicycle Program rents bicycle lockers on a quarterly or annual basis for storage of bicycles only. TAPS provides complimentary bike lock cutting service for campus cyclists who have lost their keys or whose locks are not working. The locked bike must have a current registration; unregistered bikes may be registered at the time of the lock removal. The ASUCD Bike Barn, at the Silo, offers repairs and rentals, and sells new and used bikes, bicycle parts and accessories.

**Parking.** Vehicles (including motorcycles and mopeds) parked on campus are required to display a valid UC Davis parking permit or pay for time at a meter. Parking is permitted in marked spaces only. Permits must be displayed so all information is visible through the front window. All permit types may be purchased at TAPS and many are available at <http://taps.ucdavis.edu>. Daily visitor permits may also be purchased from permit dispensers located at entrances to most visitor parking lots. Visitor permits are valid in areas posted for visitor or "C" permits. After 5 p.m. (PT), they are also honored in "A" permit areas and at meters.

**Motorist Assistance Services.** TAPS provides complimentary on-campus motorist assistance services including vehicle lock-outs, battery jumps, gasoline retrieval and tire inflation services.

**Alternative Transportation.** UC Davis encourages the use of alternative transportation options through the goClub. The goClub offers discounted transit passes and provides incentives for those who carpool, vanpool, walk, bike, or ride the train or bus to campus on a regular basis. For more information, see <http://goclub.ucdavis.edu> or call 530-752-6453.

The UC Davis/UC Davis Medical Center Shuttle provides hourly service Monday through Friday between the UC Davis campus and the medical center in Sacramento. The shuttle is available to all members of the UC Davis community. You may purchase shuttle passes at Transportation Services or the Cashier's Office (cash or check only).

The Davis/Berkeley Shuttle provides transportation between the UC Davis campus and the UC Berkeley campus for university employees, registered students and other university affiliates. Advanced reservations are required. For schedule information and reservations, visit Fleet Services at <http://fleet.ucdavis.edu> or call 530-752-8287.

## Buses

Unitrans  
5 South Hall  
530-752-BUSS; <http://www.unitrans.com>

Unitrans provides year round public transit service on 16 lines on the UC Davis campus and the City of Davis. Unlimited access is provided to undergraduate students with a valid UC Davis registration card; others may ride by paying the single-ride cash fare or by purchasing discounted multi-ride passes from TAPS or at the Unitrans business office. Full service is provided each UC Davis school day (Monday-Friday; 7:00 a.m.-8:30 p.m. (PT)) and at night (Monday-Thursday; 8:30 p.m.-11:00 p.m. (PT)) during the regular school year. Reduced schedule service operates during the summer, finals week, and all academic break periods. Unitrans operates seven of its primary lines on Saturdays, Sundays, and designated holidays. Schedules are available at the MU Campus Information Center, bus terminals, Davis City Hall, the Unitrans office and at <http://www.unitrans.com>. Real-time bus location information is available by phone, text, and website via the Nextbus automated system.

## STUDENT EMPLOYMENT

Student Employment is a resource for UC Davis students seeking employment opportunities to fund their educational expenses. The Student Employment website provides a means by which UC Davis students and employers can meet their employment needs. Full-time or part-time students, students on PELP, and students with a letter of acceptance for the following quarter who have not yet registered are eligible. There are also a wide variety of community service jobs, which can be both educational and personally rewarding. With support from the Internship and Career Center, students have easy access to both UC and non-UC student employment as well as internship and career opportunities. To research available jobs, see <http://iccweb.ucdavis.edu/students/jobsandcareers.htm>.

## WORKLIFE AND WELLNESS

Heitman Staff Learning Center  
530-754-8791; [worklife@ucdavis.edu](mailto:worklife@ucdavis.edu); <http://worklife-wellness.ucdavis.edu>

WorkLife and Wellness is the principal resource on campus for referrals, outreach, education and programming that enable students, faculty and staff to meet commitments and pursue interests both in and outside of the university. Services address child care, elder care, breastfeeding support, health and wellness, community involvement, and workplace flexibility. The unit serves as the university's liaison with the on-campus child development centers and administers the Student Parent Child Care Grant Program.

### On-Campus Child Care Programs and Resources

- **Hutchison Child Development Center** 530-752-3455; [hutchison@brighthorizons.com](mailto:hutchison@brighthorizons.com); <http://child-care-preschool.brighthorizons.com/CA/Davis/hutchison/>
- **LaRue Park Child Development Center** 530-753-8716; [laruecdc@ucdavis.edu](mailto:laruecdc@ucdavis.edu); <http://www.davischildcare.org/>
- **Russell Park Child Development Center** 530-753-2487; [russellcdc@ucdavis.edu](mailto:russellcdc@ucdavis.edu); <http://www.davischildcare.org/>

All three centers are privately owned and operated with university oversight, serving infants through preschoolers. Nationally-accredited.

- **Early Childhood Lab School at The Center for Child and Family Studies** 530-752-2888; [mloganj@ucdavis.edu](mailto:mloganj@ucdavis.edu) <http://ccfs.ucdavis.edu/EarlyChildhoodLaboratory.html>

A teaching and research laboratory for the Department of Human Ecology, offers part-time programs for infants through preschoolers. Children are selected from a waiting list according to criteria designed to meet academic goals.

- **Student Parent Child Care Grant Program** 530-754-8716; [worklife@ucdavis.edu](mailto:worklife@ucdavis.edu); [http://worklife-wellness.ucdavis.edu/family\\_care/children/childdaresub.html](http://worklife-wellness.ucdavis.edu/family_care/children/childdaresub.html)

Community Based Care Grant is a financial need-based grant available to undergraduate, graduate and professional students. Graduate Student Child Care Grant is a financial need-blind grant for graduate and professional students.

- **The UC Davis Breastfeeding Support Program** 530-754-8791; [worklife@ucdavis.edu](mailto:worklife@ucdavis.edu); <http://worklife-wellness.ucdavis.edu/breastfeedingsupport/index.html>

Quarterly classes; monthly support group meetings; lactation consultations; hospital-grade breast pumps in designated lactation sites; lactation accommodation policy.

- **Aggie Job Link** 530-752-2855; [ajlhelp@ucdavis.edu](mailto:ajlhelp@ucdavis.edu) <https://icc.ucdavis.edu/employer/ajl.htm>

Browse and post positions for child care providers.

### Community Child Care Programs

Children's Home Society; 530-723-5225  
1100 Main Street, Suite 230, Woodland, CA 95695  
[CHSYoloCounty@chs-ca.org](mailto:CHSYoloCounty@chs-ca.org)

**Child Care Resource & Referral Program**  
<http://www.chs-ca.org/child-care/ccrrp/>.

**Child Care Assistance Programs** (subsidized care)  
<http://www.chs-ca.org/child-care/ccap/>.

## HEALTH AND COUNSELING SERVICES

### Student Health and Counseling Services (SHCS)

Services are provided at two primary locations: Student Health and Wellness Center and 219 North Hall.  
Make an appointment: 530-752-2349  
General information: 530-752-2300  
<http://shcs.ucdavis.edu>

*What medical services are available on campus if I get sick or injured?*

Student Health and Counseling Services (SHCS) provides wellness resources and cost-sensitive medical care that is tailored to the unique and diverse needs of students at UC Davis. All registered students are assigned a primary care provider (PCP) who will coordinate their wellness care and treatment needs. SHCS staff include physicians, nurse practitioners, registered nurses, physical therapists, dietitians and health educators. Pharmacy, lab, and x-ray services are also available. Medical care is provided at the Student Health and Wellness Center, conveniently located on the west side of campus. Services are available to all registered students regardless of insurance coverage. When the Student Health and Wellness Center is closed, students can speak with an after-hours advice nurse at 530-752-2349.

**What mental health services are available for students?**

SHCS offers a variety of resources to help students reach academic and personal goals while at UC Davis. SHCS mental health providers are a multicultural and educationally diverse group of experienced mental health professionals, doctoral interns and postdoctoral residents. They provide short-term counseling at no cost to registered UC Davis students. Counseling Services, including initial consultations, individual and group therapy, and workshops are provided in both 219 North Hall and the Student Health and Wellness Center. When Counseling Services is closed, students may call 530-752-2349 and follow the prompts to speak with a mental health help-line provider.

**What if I have a hold on my registration because I have to submit my immunization status for Hepatitis B?**

The state requires that all first-time enrollees age 18 or younger provide a statement of immunization status for the Hepatitis B virus. Students who have not completed this requirement may have a hold placed on their registration, which may affect their ability to register for classes. Students can submit their information or request more time to complete this requirement by using the Hepatitis B Immunity Statement through the MyAdmissions website.

**Are there charges for medical services?**

Primary care, urgent care and specialty medical services (including psychiatry) have a small fee. Counseling services, advice nurse services and most health promotion resources are free. In general, a primary care visit costs \$15 and both urgent care and specialty care visits cost \$20, with additional fees for treatment supplies and medications as needed. All SHCS charges are billed directly to your student account each month. The amount can be viewed and paid using MyBill; however, detailed information about your visit is not viewable through MyBill. Detailed information can be found by logging into Health-e-Messaging, which is a secure system accessible only through your student login. More information about services, costs and billing is available on the SHCS website.

## **Student Health Insurance**

**What is the UC Student Health Insurance Plan (UC SHIP) and how do I enroll?**

The University of California (UC) requires that all students have health insurance. To ensure this requirement is met, all UC students are automatically enrolled in UC SHIP and fees for coverage are charged to your student account each term. UC SHIP includes medical, dental and vision benefits. Students with comparable health insurance can apply for a UC SHIP waiver. More information is available at <http://shcs.ucdavis.edu/insurance>.

**I already have a comparable health insurance plan. How do I waive out of UC SHIP?**

Students may apply for a student health insurance waiver at the SHCS website or may visit the SHCS Insurance Office at the Student Health and Wellness Center.

**Do I need to submit a student health insurance waiver application each quarter?**

No, student health insurance must be waived at the beginning of each academic year; however, an approved waiver is good for the duration of that academic year. Students who have waived UC SHIP and later need health insurance coverage may visit the SHCS Insurance Office to enroll at any time.

**Are Student Health and Counseling Services fees different if I am not enrolled in UC SHIP?**

No, all students have the same level of access to SHCS medical services and pay the same rates for care regardless of insurance coverage or carrier. However, when SHCS provides Affordable Care Act approved prevention and wellness services (immunizations, screening, contraception) to UC SHIP enrollees, UC SHIP covers SHCS fees. Most important, UC SHIP covers healthcare services not available at SHCS and only available off campus; e.g., emergency room visits, surgical care, MRIs, subspecialist care. More information is available on the SHCS website.

## **SHCS Counseling Services**

219 North Hall  
530-752-0871; Appointments: 530-752-2349  
<http://shcs.ucdavis.edu/>

SHCS Counseling Services offers short term counseling services to all registered students with liaison to off campus community resources. Students often seek individual or group counseling for issues such as depression, anxiety, stress, relationships, isolation, academic issues, life stressors, family problems, cultural issues, and many others. Additionally, staff can assist with educational concerns such as coping with university life, academic performance, test anxiety and reentry adjustment.

To make a counseling appointment, you can either make an appointment in-person at 219 North Hall or call 530-752-2349 during normal hours of operation and speak with one of our appointment desk staff.

- Be sure to have your class and work schedule with you before calling.
- Please check in 15 minutes prior to your scheduled appointment time.
- Registration stations are located in each waiting area.
- If you are late for your scheduled appointment time, you may be asked to re-schedule. Please keep this in mind when scheduling your appointment.
- If you cannot make your appointment, please call our appointment cancellation message line at 530-752-8821 to cancel your appointment.

**For 24-Hour Consultation.** After normal hours of operation call SHCS Counseling Services at 530-752-0871 and follow the prompts to reach a mental health counselor (press 55).

Students, faculty or staff who are concerned about a student or desire consultation or assistance in making a referral are encouraged to contact SHCS Counseling Services at 530-752-2349. Parents who are concerned about their UC Davis student's emotional reactions or behavior can also call to discuss their concerns.

## Mind Spa

A service of UC Davis Student Health and Counseling Services  
132 North Hall and Student Health and Wellness Center  
<http://shcs.ucdavis.edu/services/mindspa.html>

The Mind Spa is a great place on campus to relax and recharge or de-stress before that big exam. Resources are free to students and include a biofeedback program that provides you with essential skills for controlling your body's stress levels, massaging recliners, a conquering insomnia program, a mindful relaxation space to listen to guided meditation and relaxation audio files, light therapy and yoga sessions.

The Mind Spa frequently partners with campus organizations to offer events that focus on reducing the stigma around mental health, increasing awareness about wellness resources and providing stress-reducing activities.

The Mind Spa Wellness Ambassador program is a professionally supervised mental health program. The program's volunteer student wellness ambassadors and coordinators offer individualized peer-advocacy services and workshops that help students acquire a better understanding of campus mental health resources and the self-help skills that improve emotional wellbeing.

The Mind Spa has two locations on campus, 132 North Hall and on the second floor of the Student Health and Wellness Center. Both locations offer a safe and comfortable environment for students. No appointment is necessary and services are offered on a drop-in basis Monday–Friday, 9:00 a.m.–4:00 p.m. (PT) during fall, winter and spring quarters. The Mind Spa is closed during the summer and quarter breaks.

## Health Education and Promotion

**A Department of Student Health and Counseling Services**  
UC Davis Student Health and Wellness Center  
530-752-9652; <http://shcs.ucdavis.edu/hep>

Health Education and Promotion (HEP) helps students stay healthy, thrive and enhance their academic and personal success through the creation of health-promoting campus and community environments and student-centered health education. HEP focuses on promotion of healthy eating, physical activity, sexual health, alcohol, tobacco, other drug risk reduction, wellness, sleep, and other wellness issues.

**Anonymous HIV Counseling and Antibody Testing Program.** In partnership with the LGBTQIA Resource Center, HEP facilitates anonymous HIV counseling and antibody testing to registered UC Davis students. Free, oral, rapid testing is available weekly during the academic year at the LGBTQIA Resource Center; for more information, see <http://shcs.ucdavis.edu/services/hiv-testing.html>.

Sexual health services also include the "Love Lab" mobile cart offering safer sex supplies and educational information at no charge to students. More sexual health resources can be found at <http://shcs.ucdavis.edu/hep/sh/index.html>.

**Alcohol, Tobacco and Other Drug (ATOD) Risk Reduction** oversees the Safe Party Initiative and provides educational programs and implements environmental management strategies to reduce unwanted negative consequence resulting from the use of alcohol. For more information, see <http://safeparty.ucdavis.edu>.

**UC Davis Farmers Market 530-752-9652.** HEP is one of several co-sponsors of the campus farmers market offered during fall and spring quarters. Fresh fruits, vegetables, nuts, and flowers are available. For more information, see <http://farmersmarket.ucdavis.edu/>.

**Wellness Portal.** The online portal assists students, staff and faculty in locating resources related to the various aspects of wellness. This "one stop shop" for wellness includes campus resources, as well those in the City of Davis and the larger Web community; see <http://mywellness.ucdavis.edu>.

**Outreach Presentations 530-752-9652.** Peer Health Educators and professional staff are available to facilitate small and large group presentations and workshops for residence halls, fraternities, sororities and other student organizations. For a complete list of programs offered or to schedule a program, see <http://shcs.ucdavis.edu/hep/presentations.html>.

**Student Positions.** HEP offers paid and volunteer opportunities for students. The positions provide an excellent opportunity to develop skills in: conducting group presentations, changing health-related policies and influencing media. Transcript notation and/or academic credit are available. All positions require a three quarter commitment. See our website beginning winter quarter regarding student opportunities at <http://shcs.ucdavis.edu/about/employment-hep.html>.

## EXTRACURRICULAR ACTIVITIES

By participating in extracurricular activities at UC Davis, you can benefit from numerous opportunities for educational, personal, cultural and social enrichment. In general, registered and enrolled UC Davis students may participate in extracurricular activities sponsored by the campus. Some activities have additional eligibility criteria, so you are encouraged to inquire about the particular requirements of the groups and programs that interest you.

## CAMPUS RECREATION AND UNIONS

### The Department of Campus Recreation and Unions

The Activities and Recreation Center (ARC)  
232 ARC, One Shields Ave, Davis CA 95616  
530-752-1730; <http://cru.ucdavis.edu>

The UC Davis Department of Campus Recreation and Unions manages the following programs and facilities, which serve the campus by creating opportunities to build community, cultivate friendships and enhance learning.

These programs complement the academic mission of the university and enhance the quality of life for the campus.

The following facilities are managed through the Department of Campus Recreation and Unions:

- Activities and Recreation Center (ARC)
- Craft Center
- Equestrian Center
- Hickey Pool
- Memorial Union
- Memorial Union Games Area
- Outdoor Adventures Center
- Pavilion

- Putah Creek Lodge
- Recreation Fields
- Recreation Pool
- UCDHS Student Fitness Center

The following programs are offered through the Department of Campus Recreation and Unions:

## Campus Recreation and Unions Memberships, Informal Recreation and Fitness & Wellness Programs

Activities and Recreation Center (ARC)  
530-752-1730; <http://cru.ucdavis.edu/arc>;  
<http://cru.ucdavis.edu/fitnessandwellness>

The ARC, the region's premier full-service fitness facility, offers a variety of features, such as four indoor basketball courts (convertible to volleyball and badminton), eight four-wall courts, a multi-use activity center (MAC), an indoor track, large fitness/weight areas, and an indoor climbing wall. In addition, the complex includes group exercise, dance and martial arts studios, a student lounge with computer terminals and wireless access points, a large ballroom, a small conferencing center, a full-service Starbucks, and a Pro Shop. Currently enrolled UC Davis students may use the ARC at no additional cost. Programming within the ARC—including group exercise, dance classes, martial arts classes, personal training, rock climbing, and intramural sports—may require an additional fee. UC Davis faculty, staff, alumni, and retirees may enjoy the ARC by purchasing an affordable membership. For more information on the ARC, see <http://cru.ucdavis.edu>.

## Cal Aggie Marching Band

Activities and Recreation Center (ARC)  
530-752-6569; <http://cru.ucdavis.edu/calaggiemarchingband>

The California Aggie Marching Band is a student-run volunteer organization dedicated to providing support for UC Davis and is committed to student development and camaraderie through excellence in musical entertainment and the embodiment of Aggie Pride. Known by many as the "Band Uh!," the band celebrates campus traditions and entertains participants and spectators at athletic, campus and community events.

## Aquatics

### Recreation Pool

Corner of La Rue Road and Hutchison Drive  
530-752-1730; <http://cru.ucdavis.edu/aquatics>

Located near the ARC, the Recreation Pool's distinctive shape allows for a wide variety of water activities. The pool includes lap lanes, diving boards, an island, a large grass area for sunbathing and a shallow wading pool. Picnic tables and a barbecue are also available on a first-come, first-served basis. The Rec Pool also offers swim lessons for all ages. The pool opens for the season in mid-April and closes on the last day in September.

### Hickey Pool

Hickey Gymnasium Building courtyard; central campus  
530-752-1730; <http://cru.ucdavis.edu/aquatics>

Hickey Pool is a seven-lane, 33-and-1/3 yard pool with a movable bulkhead previously used as the competitive pool on campus, housing six intercollegiate athletic teams, as well as physical edu-

cation classes, intramural sports, sport clubs, and University Extension classes. Today, the heated Hickey Pool is available to students and ARC members for lap swimming hours during the year.

## Craft Center

South Silo  
530-752-1475/1730; <http://cru.ucdavis.edu/craftcenter>

The Craft Center is an ideal place to channel your creative energy, offering more than 90 affordable and fun classes each quarter. The center's 10 well-equipped studios are available for informal use on a daily or quarterly basis. Workshops and classes are offered each quarter in woodworking, weaving, jewelry making, art and graphics, computer imaging, ceramics, photography, silk-screen printing, welding, leather working, stained glass and other crafts.

## Equestrian Programs

Garrod Drive; southwest of Veterinary Medical Teaching Hospital  
530-752-2372; <http://cru.ucdavis.edu/equestriancenter>

The 25-acre Equestrian Center is open year round, offering horse riding instruction in both English and Western riding. Group lessons are available for beginning through advanced levels, along with training in horse care and stable management. The Equestrian Center sponsors clinics, horse shows, and special events. The center is also home to the UC Davis Equestrian Club.

## Intramural Sports and Sport Clubs

Activities and Recreation Center (ARC)  
530-752-1730;  
<http://cru.ucdavis.edu/intramuralsports>  
<http://cru.ucdavis.edu/content.cfm?contentID=79>

Campus Recreation and Unions' Competitive Sports program provides UC Davis students, faculty and staff the opportunity to participate in a variety of competitive and recreational sports on campus.

The Intramural Sports program offers numerous sports leagues, tournaments, and events throughout the year, including soccer, badminton, softball, flag football, ultimate, and volleyball. The Sport Club program promotes student participation in a wide variety of athletic activities, provides opportunity for student competition at various levels of play, and fosters the development of student leadership. Sport clubs are comprised of students, faculty and staff of the university.

## Memorial Union (MU)

Guest Services Desk  
530-752-2222; <http://cru.ucdavis.edu/memorialunion>

The MU Complex is a central gathering place for all UC Davis Students. It houses a variety of student services and activities, including the ASUCD student government offices, Center for Student Involvement (CSI) Office, Coffee House, UC Davis Store, Games Area, Transfer Reentry Veterans Center, and the suite of MUII meeting/conference facilities. In addition, the MU lounge spaces serve as a comfortable space for studying and getting together with friends.

## Memorial Union Games Area

Games Area; located below the UC Davis Bookstore 530-752-2580; 530-752-1730; <http://cru.ucdavis.edu/gamesarea>  
The Games Area features bowling lanes, billiards, video game consoles, lounge space and storage lockers. Bowling leagues, classes, clinics and tournaments are offered for all ages from beginning through advanced skill levels. The facility is fully accessible to those with disabilities.

## Outdoor Adventures

Located between the Colleges at La Rue Apartments and the Recreation Pool on La Rue and Hutchison Barn; corner of California and Hutchison 530-752-1995; <http://cru.ucdavis.edu/outdooradventures>

Outdoor Adventures will help you develop your outdoor skills and plan your outdoor excursion. You can rent professional quality equipment and arrange custom-designed trips. An up-to-date library contains topographic maps, trail guides and other materials. Outdoor Adventures offers classes, excursions and clinics for backpacking, rock-climbing, whitewater rafting, sea kayaking, mountaineering, cross-country skiing and more. Outdoor Adventurers also offers health care training classes in wilderness first aid, EMT, CPR, and AED and swift water rescue.

## The Buzz

530-752-2027; <http://studentlife.ucdavis.edu/thebuzz>

The campus kicks off the school year on the first Friday of Fall Quarter with The Buzz, a festival filling the entire Quad. Part of Fall Welcome week, The Buzz welcomes new and returning students to campus with a night of live entertainment, games, prizes, free food and campus resources.

## UC DAVIS STORES

530-752-6846; <http://ucdavisstores.com>

The UC Davis Stores are full-service stores owned and operated by the university. They provide goods and services for the campus community to support the university's academic mission, as well as UC Davis-branded apparel, general merchandise and gifts.

## SILO UNION

The Silo Union houses food services, study space and the campus pub. Silo food services include both quick, popular and familiar fast food, such as Taco Bell, Carl's Jr. and Pizza Hut, as well as a large selection of fresh and healthy prepared items, Starbucks Coffee and a custom sandwich line. Located in the South Silo are the African Diaspora Center for Student Success, Craft Center, and Graduate Student Association.

## THE UC DAVIS ACTIVITIES AND RECREATION CENTER (ARC)

530-752-1730; <http://cru.ucdavis.edu/arc>

The Activities and Recreation Center (ARC) hosts many recreational activities for the UC Davis community. The building itself has four indoor basketball courts (convertible to volleyball and badminton), eight four-wall courts, a multi-use activity center (MAC), an indoor track, large fitness/weight areas and an indoor climbing wall. In addition, the complex includes group exercise,

dance and martial arts studios, student lounges with computer terminals and wireless access points, a large ballroom, a small conferencing center, a full-service Starbucks, and a Pro Shop. The building is separated into three distinct areas: the controlled area, the conference and event area and The Pavilion. All fitness related activities comprise the controlled area that is open to all students with a valid UC Davis identification card. Faculty, staff, alumni, retirees and others may purchase membership to the ARC for an annual or monthly fee. The conference area is accessible through the main entrance to ARC or through a smaller corridor on the Northeast side of the building that leads into the conferencing area.

The UC Davis Pavilion, formerly Recreation Hall, hosts athletic competitions, concerts, trade shows, conferences and miscellaneous spectator events each year. The Pavilion houses approximately 149,000 square feet of space and encompasses the home court of the UC Davis Aggies volleyball team, gymnastics team, and men's and women's basketball teams. The Pavilion hours and access vary depending upon the event being hosted. More information regarding the ARC can be found at the ARC website, calling the number listed or by stopping by the ARC member services desk located in the lobby area.

## UC DAVIS INTRAMURAL SPORTS AND SPORT CLUBS

530-752-1730;  
<http://cru.ucdavis.edu/intramuralsports>  
<http://cru.ucdavis.edu/content.cfm?contentID=79>

The UC Davis Intramural Sports and Sport Clubs programs offer many different competitive sports activities ranging from the traditional team sports like football, basketball and soccer to individual or dual sports such as racquetball, table tennis and golf. Additionally, we offer some non-traditional activities like inner tube water polo, floor hockey and dodgeball. All UC Davis students are eligible to participate in intramural activities. Our Sport Clubs program offers many opportunities for intercollegiate competition. Each club is formed, developed, directed and controlled by its members within University guidelines. Stop by the office or see our website for a complete list of clubs.

## INTERCOLLEGIATE ATHLETICS

264 Hickey Gymnasium  
530-752-1111

The Intercollegiate Athletics (ICA) program is an integral part of the total educational process and a vital part of the human development of young men and women.

Intercollegiate athletics attempts to strengthen the integration of its objectives with the academic and developmental objectives of the university while maintaining a program of academic and athletic excellence; where students are supported in their efforts to reach the highest level of performance by providing them with adequate to outstanding facilities, quality coaching, appropriate support of health and wellness needs, and competitive opportunities with students from similar institutions.

Currently, the program consists of varsity teams in 14 women's and 9 men's sports. UC Davis is an active member of Division I. A majority of the varsity sports compete in the Big West Conference. Approximately 600 students compete on varsity teams each year.

## ARTS

Whether you want to participate, be entertained or be inspired, an abundance of musical, theater, art, design and dance offerings take place on campus all year long.

### **Robert and Margrit Mondavi Center for the Performing Arts | UC Davis**

Mondavi Center Administration Building  
530-754-5000; <http://www.mondaviarts.org>

The Mondavi Center is the premier performance venue in Northern California and the regional destination for the best in music, dance, distinguished speakers, jazz, theater, and world music.

UC Davis students receive 50% off every Mondavi Center Presents event ticket, while UC Davis Staff and Faculty enjoy 10% off their ticket purchases. Tickets are available through the Mondavi Center Ticket Office at 530-754-2787 or at <http://www.mondaviarts.org>.

## Music

Department of Music  
530-752-5537; <http://music.ucdavis.edu>

The Department of Music sponsors the UC Davis Symphony Orchestra, the University Chorus, Early Music Ensemble, Concert Band and Wind Ensemble, Jazz Band, several world music ensembles, and chamber music groups. Music majors and other interested students can receive credit for participating in these groups, which perform at concerts and recitals open to the university community. The department sponsors artists-in-residence who give concerts, recitals and lectures. Free noon concerts featuring individual performers and ensembles—both professional musicians and music students—are a favorite weekly event during the school year. The Empyrean Ensemble is in residence on campus. The Department of Music sponsors more than 100 public concerts each year.

## Theatre and Dance

Department of Theatre and Dance  
Wright Hall; <http://arts.ucdavis.edu/theatre-dance>

### **The Theatre and Dance Major Program**

The Department of Theatre and Dance facilities are complemented by an excellent faculty and production staff, as well as the Granada-Artist-in-Residence program, which brings a major director, choreographer or playwright to the department three times a year. The faculty includes a group of distinguished scholars in history, theory and criticism whose research and teaching focuses on social engagement and activism. Students, both majors and non-majors, can audition for department productions or apply to the Institute for Exploration in Theatre, Dance and Performance to do related work.

The A.B. degree in Theatre and Dance provides students with an appreciation for an understanding of performance and its role in culture and society. The program offers a strong foundation in all aspects of drama, theatre, dance performance, and production. Students build significant skills in specific areas (including acting, directing, choreography, design, playwriting and devising, production skills and management) as well as achieving a broad knowledge of theatre and dance.

**Productions and Facilities.** Each year's schedule includes opportunities to work with professional directors and choreographers in three Granada Artists-in-Residence productions; the Main Stage Dance/Theatre Productions; Film Festival at UC Davis; projects generated through the Institute for Exploration in Theatre, Dance and Performance; and workshops and performance projects developed by M.F.A and Ph.D. students. These productions are staged in our proscenium (Main), thrust (Wyatt), black box (Arena), performance studio (Della Davidson Performance Studio) and intimate laboratory theatre (Lab A), as well as in the Mondavi Center's Vanderhoef Studio Theatre and Jackson Hall. These productions are part of the academic program of the department and serve an important purpose in the study of theatre and dance. Participation is open to all students.

## Art Galleries

### **Manetti Shrem Museum**

530-752-8500; <http://manettishremmuseum.ucdavis.edu>

UC Davis' new art museum, the Jan Shrem and Maria Manetti Shrem Museum of Art, will open on November 13, 2016. The 60-year legacy of experimentation lives on at the Manetti Shrem Museum. Grounded in the work of UC Davis' world-renowned first generation art faculty, the museum will be a hub of creative practice for today's thinkers, makers and innovators, now and for generations to come. When the museum opens, make plans to stop by on your lunch break or between classes and refresh yourself with art and ideas. The museum will be open to all for free.

### **UC Davis Design Museum**

124 Cruess Hall 530-752-6150;  
<http://designmuseum.ucdavis.edu>

The UC Davis Design Museum and Collection enhances and supports the teaching and research activities of the Department of Design, exploring how design shapes, improves and makes economically viable the objects, technology and environments we use, inhabit and experience every day. The museum exhibits national and international design-related materials including architecture, fashion, textiles, graphics, new media, product, furniture and lighting, and serves as a laboratory for experimental exhibition design and interpretation.

### **Fine Arts Collection**

Art Building, adjacent to the Nelson Gallery 530-752-8500

The Fine Arts Collection, representing various historical periods and cultures, is the UC Davis campus' major collection of art.

### **Basement Gallery**

Art Building basement

The Basement Gallery is a student-directed gallery that exhibits the artwork of advanced UC Davis art majors. The Basement Gallery is a vital alternative space for seeing important new work and for experiencing interesting and innovative art shows. There are approximately three shows per quarter. For more information, see <http://ucdbasementgallery.com/information/>.

### C.N. Gorman Museum

1316 Hart Hall 530-752-6567; <http://gormanmuseum.ucdavis.edu>  
 Monday-Friday, 12-5 p.m.; Sun: 2-5 p.m. (PT), closed holidays and holiday weekends.

The C.N. Gorman Museum is committed to the creative expressions of Native American artists, and artists of diverse cultures and histories. Changing exhibits feature contemporary artwork in a wide range of media, reflecting the canon in which Indigenous artists are working today. Founded in 1973 by the Department of Native American Studies, the museum is named in honor of retired faculty member, Carl Nelson Gorman, Navajo artist, WWII code-talker, cultural historian, and advocate for Native peoples.

## STUDENT GOVERNMENT

### Associated Students (ASUCD)

Student Government Administrative Office  
 348 Memorial Union 530-752-3632

ASUCD Student Services Office  
 347 Memorial Union 530-752-1990; <http://asucd.ucdavis.edu>

The Associated Students of the University of California, Davis (ASUCD), authorized by the regents and the chancellor, represents all undergraduate students and is responsible for over \$11 million used to enhance the student experience. Graduate and law students also have access to all ASUCD commercial activities. Funds allocated to ASUCD provide for activities and services that make life as a student a little easier, less expensive and/or simply more fun.

ASUCD operates more than 40 activities, including the Unitrans bus system, The *California Aggie* newspaper, the Bike Barn repair services, free legal advice for undergraduate students, Campus Copies, Classical Notes, Project Compost, Cal Aggie Camp, U.S. Post Office and the Coffee House, among others.

The ASUCD-sponsored Experimental College offers a variety of nontraditional classes each quarter for students interested in diversifying their educational experience. The community garden is available to students and non-students alike. Radio KDVS stereo 90.3 FM, the student-run campus radio station, broadcasts at 5,000 watts. Other ASUCD activities include Entertainment Council and the Whole Earth Festival.

Picnic Day, a UC Davis tradition since 1909, is the largest student-run event in the nation. This annual spring open house features more than 100 exhibits and cultural displays, including a parade, a fashion show, sports, sheep dog trials, dachshund races, food, music and dancing.

You can find information about ASUCD programs at <http://asucd.ucdavis.edu>, in the Student Directory, which combines details about ASUCD services and organizations with the ASUCD student telephone directory or by visiting the ASUCD Student Services Office in the Memorial Union.

Allocated funds are budgeted through the ASUCD Senate. Based on a modified form of the U.S. Senate, the ASUCD senate consists of 12 elected senate members and the ASUCD president and vice president. The senate is the policy-making body for ASUCD and supervises all aspects of the association. The ASUCD president is the chief administrative officer and is assisted by the vice president. ASUCD is the liaison for the undergraduate student body and represents the students with other universities, the UC Office of the President and the regents.

The ASUCD Senate is the policy-making body of the student government and are responsible for allocating funds through their annual budget hearings. The Senate consists of 12 members who serve year-long terms with elections held during the fall and winter quarters.

Seven commissions and one committee advise the senate and assist the governing board with its decisions by researching legislation and making recommendations. Commission chairs are ex-officio members of the senate. Each commission also involves itself with various projects that relate to its specific area.

- Academic Affairs advocates students' rights in the area of academics, including dealing with the Academic Senate and with issues such as grading policies, tenure and teacher evaluations. Academic Affairs also sponsors the popular "Last Lecture Series."
- Business and Finance makes recommendations to the Senate on all financial matters and conducts audits on ASUCD commercial units.
- Environmental Policy and Planning addresses all issues and concerns that pertain directly to the environment.
- Ethnic and Cultural Affairs makes recommendations on policies and programs concerning UC Davis' ethnic community, acts as a liaison between on-campus and off-campus bodies affecting ethnic students and their quality of life at the university.
- External Affairs deals with off-campus concerns including the regents, UC Office of the President, and the Davis City Council.
- Internal Affairs recommends policies to improve ASUCD operations and the quality of nonacademic student life on campus.
- The Gender and Sexuality Committee actively promotes awareness of gender and sexuality issues, and prevention of sexual assault through outreach efforts and education programs.
- The Elections Committee ensures the fair administration of ASUCD online elections. The Committee coordinates candidate and ballot measure forums and provides unbiased election information.

The ASUCD President is the chief administrative officer and is assisted by the Vice President. ASUCD is the liaison for the undergraduate student body and represents the students with other universities, the community, the UC Office of the President and the regents.

The judicial branch consists of the ASUCD Student Court. The nine member court has the responsibility to carry out all rules designated to it in the ASUCD Constitution and its bylaws. ASUCD Court Members serve "life" terms, lasting four years or their entire academic career at UC Davis.

### UC Davis Administrative Advisory Committees

Office of the Chancellor; <http://aac.ucdavis.edu/>

The Office of the Chancellor encourages students to participate in issues affecting the campus community by applying for membership on an administrative advisory committee. Each committee focuses on a specific area, such as child and family care, disability issues, diversity, or student services and fees. The committees respond to requests for advice, identify needs or concerns within the charge of the committee and recommend action to the campus administration.

Applications are accepted each winter for service on committees the next academic year. Undergraduate students should contact ASUCD Student Advocacy. Graduate students should contact the Graduate Student Association.

## Graduate Student Association (GSA)

Graduate Student Association (GSA)  
Room 253, South Silo  
530-752-6108; Fax 530-752-5158; [gsa@ucdavis.edu](mailto:gsa@ucdavis.edu); <http://gsa.ucdavis.edu>

The Graduate Student Association (GSA) is the officially recognized student government for UC Davis graduate students. GSA provides a forum for addressing the concerns of graduate students and promotes communication with campus administrators. GSA also serves as an advocate at all levels of the university on behalf of graduate students. Funded by graduate student fees, GSA provides services to all academic graduate students and to professional students in both the Graduate School of Management and the School of Education. Services include new student orientation, travel awards, announcements and assorted social events. Other professional students are eligible to join GSA by paying a fee.

GSA General Assembly representatives are usually designated by other students in their department or graduate group but can be selected through other processes determined by their department or graduate group. General Assembly meetings are held once a month and are open to all graduate and professional students. Each year the General Assembly elects the members of the Executive Council, who serve in a variety of positions to carry out the policies and functions of the organization.

## CENTER FOR STUDENT INVOLVEMENT (CSI)

442 Memorial Union  
530-752-2027; <http://csi.ucdavis.edu>

Research shows that college students engaged in campus life through activities and organizations feel more connected to campus, are more satisfied with their college experience and are more likely to graduate than non-involved students. The Center for Student Involvement (CSI) provides opportunities for campus engagement, co-curricular learning, leadership development, professional and personal growth, service, cross-cultural interaction and awareness, collaboration and community building by supporting a wide variety of student organizations and campus programs.

## Student Organizations

Over 750 student organizations are registered and supported at UC Davis through Center for Student Involvement. Organizations range in focus, with categories including: academic, professional, cultural, political, religious, service, ethnic, international, social, recreational, performing arts, fraternity/sorority and advocacy. Student organizations provide the entire campus community with

important educational experiences and opportunities for students to make friends, build community and find their home at UC Davis. Visit the CSI website to browse currently registered student organizations and learn more about how to get involved!

## Involvement Fair

530-752-2027; <http://csi.ucdavis.edu>

The annual Involvement Fair is an ideal opportunity to learn how to get involved, meet new people, try new activities and find a place to belong. Over 200 student organizations and campus programs provide information and hope to recruit new members like you.

## Sorority and Fraternity Life

530-752-4606 or 752-3828; <http://osfl.ucdavis.edu>

Affiliation with fraternities and sororities provides a connection to campus through friendships, a support group for academic and personal growth, leadership opportunities and involvement in campus activities and traditions.

## Student Retention and Recruitment Center

1100 Student Community Center  
530-754-6836; <http://srrc.ucdavis.edu>

The Student Recruitment and Retention Center (SRRC) offers student-run and student-initiated programs that foster holistic academic and personal development, raise political and cultural awareness. We aim to empower students to act as dynamic leaders in their communities. SRRC programs include peer mentoring, academic/study support, leadership development, transfer student support, community building, self-awareness, K-12 enrichment, transfer outreach/support and funding for services and activities complementary to the SRRC's mission.

## Cal Aggie Student Alumni Association (SAA)

Walter A. Buehler Alumni Center  
530-752-0286; <https://saa.ucdavis.edu>

Student Alumni Association (SAA) follows the mission of "advancing student-alumni relations" by building community through networking events, providing student leadership opportunities, upholding Aggie traditions, and offering benefits and services, such as 10% off textbooks from the UC Davis Bookstore. Programs include Aggie Diner, Interview with an Aggie, Take an Aggie to Work, Pajamarino, and community service opportunities. You may join SAA at any time during the academic year. SAA membership fees are applied to your Cal Aggie Alumni Association life membership after graduation. For more information about joining SAA, see <https://saa.ucdavis.edu>.

## **UNIVERSITY POLICY ON NONDISCRIMINATION, SEXUAL HARASSMENT/SEXUAL ASSAULT, DISABILITY ACCOMMODATIONS, STUDENT RECORDS AND PRIVACY**

**Nondiscrimination.** The University of California, Davis, does not discriminate on the basis of race, color, national origin, religion, sex, gender identity, pregnancy (including pregnancy, childbirth, and medical conditions related to pregnancy or childbirth), physical or mental disability, age, medical condition (cancer related or genetic characteristics), ancestry, marital status, citizenship, sexual orientation, or service in the uniformed services (includes membership, application for membership, performance of service, application for service, or obligation for service in the uniformed services), status as a Vietnam-era veteran or special disabled veteran, in accordance with all applicable state and federal laws, and with University policy. As required by Title IX, the University of California, Davis, does not discriminate on the basis of sex in its educational programs, admissions, employment, or other activities.

Information about campus policies and procedures for reporting and addressing incidents of alleged harassment, discrimination and incidents of hate and bias may be found at <http://hdapp.ucdavis.edu>.

Inquiries related to Title IX and to Section 34 CFR § 106.9 may be referred to the Title IX Coordinator:

Wendi Delmendo  
 Mrak Hall, Fourth Floor  
 One Shields Ave, Davis, CA 95616  
 530-752-9466  
[wjdelmendo@ucdavis.edu](mailto:wjdelmendo@ucdavis.edu)

Inquiries related to Title IX at the UC Davis Medical Center may also be referred to the Deputy Title IX Coordinator for the UC Davis Medical Center:

Cindy Oropeza  
 2730 Stockton Blvd.  
 Ticon III Rm 2200  
 Sacramento, CA 95817  
 916-734-8104  
[cgoropeza@ucdavis.edu](mailto:cgoropeza@ucdavis.edu)

Inquiries may also be directed to the:

Assistant Secretary for Civil Rights of the Department of Education  
 San Francisco Office  
 U.S. Department of Education  
 50 Beale Street, Suite 7200  
 San Francisco, CA 94105-1813  
 415-486-5555  
[OCR.SanFrancisco@ed.gov](mailto:OCR.SanFrancisco@ed.gov)

**Sexual Harassment/Sexual Assault.** The University of California is committed to creating and maintaining a community free of sexual violence and sexual harassment. Sexual violence and sexual harassment violate both law and University policy. Any member of the University community may report conduct that may constitute sexual violence, sexual harassment, retaliation, and other prohibited behavior (“Prohibited Conduct”). The University will respond promptly and equitably to such reports, and will take appropriate

action to stop, prevent, and remedy the Prohibited Conduct, and when necessary, to discipline the Respondent.

In addition to sexual harassment, discrimination based on sex, gender, gender identity, gender expression, sex- or gender-stereotyping, and sexual orientation violates law and other University policies. Such discrimination may also contribute to the creation of a hostile work or academic environment based on sex and thus constitute or contribute to sexual harassment. Harassment that may not be sexual, but still contributes to a hostile work or academic environment, may also violate the University's other non-discrimination policies.

Campus policies and procedures for reporting and addressing sexual violence and sexual harassment may be found at <http://sexualviolence.ucdavis.edu>.

**Accommodations for Students with Disabilities.** Students with documented disabilities may be entitled to reasonable accommodations to gain access to the University's academic programs. More information about academic accommodations can be obtained by contacting the Student Disability Center 530-752-3184 or <http://sdc.ucdavis.edu>. Questions or concerns about accommodations that are not related to academic programs should be directed to the UC Davis Compliance Director (ADA Officer) 530-752-9466.

**Disclosures from Student Records.** Students have the right to review records that relate to themselves in their capacity as students and to request corrections of records believed to be inaccurate. Most disclosures from student records to outside parties require prior consent from the student.

Under the Family Educational Rights and Privacy Act of 1974 and University and campus policies, UC Davis students have the following rights:

- A. To review their own student records within 45 days after the student submits a written request for access to the University Registrar or other department in possession of the records. That office will make arrangements for access and notify the student when and where the records may be reviewed. If the records requested are in a different office, the request will be redirected and the student notified. The campus maintains several types of student records in various locations. Questions about how to obtain records should be referred to the Office of Student Support and Judicial Affairs at 530-752-1128.
- B. To request amendment of their own student records if they believe the records are inaccurate or misleading, students should submit a written request to the office that maintains the records specifying the portion of the record the student wants changed and why it is believed to be inaccurate or misleading. That office has 45 days to determine whether the record should be changed and notify the student of the decision. If a student wishes to contest this decision, the student should contact the Office of Student Support and Judicial Affairs.
- C. To restrict the disclosure of personally identifiable information contained in student records, except when law and policy permit disclosure without consent. Examples of circumstances in which the student's consent is not required for disclosure of student records include the following:
  - Disclosure of “directory” or “public” information including the student's name; local and/or permanent address(es); email addresses and telephone number(s); dates of atten-

dance; major field(s) of study [major, minor, concentration, specialization, and similar designations]; grade level; enrollment status (undergraduate/graduate, full time or part time, number of enrolled course units) degrees and honors received; most recent previous educational institution attended; participation in officially recognized activities, including Intercollegiate Athletics (ICA), and the name, weight and height of participants on ICA teams.

- To prevent disclosures of telephone numbers and/or addresses, students must submit a Directory Confidential Update Form to the Office of the University Registrar. To prevent disclosure of their email address, students must follow instructions at <https://computingaccounts.ucdavis.edu/>, and select the *Change your directory information* option.
- Students may designate all information about themselves as confidential and withhold it from public disclosure by filing a request with the Office of the University Registrar in 3100 Dutton Hall. If all information is designated confidential, UC Davis cannot respond to requests for verification of student status or degrees, make public any honors, or include the student's name in the commencement program without the student's specific written consent.
- Disclosure to campus officials (for example faculty, staff, student employees, or those under contract with the University) having a legitimate educational interest in the records. Legitimate educational interest means the information is relevant and necessary to a task or determination that is (a) an employment responsibility or an assigned subject matter for the inquirer and/or related to (b) the inquirer's participation in the student's education; (c) the discipline of a student; or (d) providing a service or benefit related to a student or student's family (such as health care, counseling, job placement, or financial aid).
- Disclosure of appropriate student records, including academic records, disciplinary records, and other student records, to other educational institutions in which a student seeks or intends to enroll, or is currently enrolled, so long as the disclosure is for purposes related to the student's enrollment or transfer

For more information, see UC Davis Policy and Procedure Manual Section 320-21 at <http://manuals.ucdavis.edu/ppm/320/320-21.pdf>.

Contact the Office of Student Support and Judicial Affairs 530-752-1128 for questions about these rights and requirements. Student complaints regarding alleged violations of privacy rights should be submitted to Student Judicial Affairs.

Students may also contact the U.S. Department of Education concerning alleged violations of these requirements, addressed to the Family Policy Compliance Office, U.S. Department of Education, 400 Maryland Avenue, SW, Washington, DC. 20202-4605. See Section 99.63 at <http://www.ed.gov/policy/gen/guid/fpcos/ferpa/index.html>.

**Social Security Numbers.** A student's Social Security number is used to verify personal identity in the UC Davis Student Records System. Students are mandated to disclose their social security number to UC Davis. In compliance with state law, Social security numbers are confidential and are not used as student identifiers.

**Release of Registration Material and Grades.** In compliance with student privacy rights under federal and state law and University policy, the Office of the University Registrar may not release a student's grades, registration material, and/or identification card to anyone other than the student without specific written authorization signed by the student. The person to whom the information, material, or card is released must be designated by name and must present proof of identity. The signed authorization is kept in the "Record of Disclosures" in the student's file.

## CAMPUS SECURITY, CRIME AWARENESS, AND ALCOHOL AND DRUG ABUSE PREVENTION

In accordance with federal law, UC Davis annually provides makes available to students and employees information regarding campus security, crime statistics, and alcohol and drug abuse prevention, pursuant to the Student Right to Know and Campus Security Act of 1990 and the Drug Free Schools Act of 1989. The UC Davis Police and Campus Administration make continual efforts to reduce crime on campus. A well-informed community is better served and safer.

For more information on:

- Security and crime awareness, see <http://police.ucdavis.edu/index.html>.
- Alcohol and Drug Abuse Prevention, see <https://shcs.ucdavis.edu/>.
- Victim support services, see <http://care.ucdavis.edu/>.



**ACADEMIC ADVISING AND STUDENT SERVICES**

## ACADEMIC ADVISING

UC Davis offers many different types of academic advising to help you get the most from your education. College advisers can assist you in meeting degree requirements and taking maximum advantage of the resources available at the university. A conference at least once a quarter with your faculty or staff adviser is especially desirable during your first year and during your final quarters preceding graduation. A meeting with a faculty or staff adviser is required each year for College of Engineering and College of Letters and Science students. Matriculating students in their first year at UC Davis in the College of Biological Sciences are required to meet with a staff adviser in the Biology Academic Success Center.

## COLLEGE ADVISING

### College of Agricultural and Environmental Sciences

Office of the Dean  
150 Mrak Hall  
530-752-0108; <http://www.caes.ucdavis.edu>

In the dean's office you will find:

- Staff advisers who can help with university and college rules, regulations and policies and procedures that affect students
- Academic advising; in-depth advice regarding probation/dismissal status, admission to the college, readmission, second baccalaureate options, and limited status enrollment requirements
- Advice and action on petitions
- Other services including college English requirement check, release of holds on registration and final evaluation for graduation

### Associate Dean of Undergraduate Academic Programs

Associate Dean  
150 Mrak Hall  
530-752-0108

The college has an associate dean of undergraduate academic programs and advising staff who welcome the opportunity to become acquainted and to talk with individual students. They can also help you with academic problems if you are placed on probation or subject to dismissal.

**Faculty Advisers/Staff Advisers.** You will be assigned a faculty adviser to help you plan a program that corresponds to your individual educational interests. The master advisers coordinate advising within a major. Staff advisers in the department can advise you on courses, specific requirements of majors and career opportunities. You are strongly urged to consult with your faculty adviser or staff adviser each quarter before selecting your courses.

As educational objectives evolve, you may, in consultation with the master adviser for your major, choose a new faculty adviser whose area of expertise corresponds more directly to your specific objectives.

### ***Undeclared/Exploratory Program (non-degree program)***

150 Mrak Hall  
530-752-0108

Are you unsure what major you really want to pursue? If so, you may want to register in the Undeclared/Exploratory Program. With the help of staff in the dean's office and the major advisers, you can explore specialized options, develop your decision-making abilities and select the major best suited to your needs. For registration purposes, indicate "Undeclared/Exploratory" on your admissions materials. You must declare a major before you complete 90 units; see [Declaration of Major, on page 85](#), in the [Academic Information](#) chapter.

## College of Biological Sciences

Biology Academic Success Center  
1023 Sciences Laboratory Building  
530-752-0410; <http://basc.ucdavis.edu>

The College of Biological Sciences offers complete academic advising services at the Biology Academic Success Center (BASC) for all students working on, or interested in, a major administered by the College. Students who declare or intend to declare majors in Biochemistry and Molecular Biology; Biological Sciences, Cell Biology; Evolution, Ecology and Biodiversity; Genetics and Genomics; Microbiology; Neurobiology, Physiology, and Behavior; Plant Biology; or are Undeclared Life Sciences should meet with their BASC adviser for program planning. At the BASC, academic advisers advise on all major, college and university requirements, policies, and procedures, including PELP, withdrawal, readmission, change of major or college, multiple majors and late actions. The BASC advisers evaluate transfer work, discuss petitions for variance and provide degree checks for graduation purposes.

The BASC is responsible for the academic progress of all students majoring in the college. If you have any problems (personal, medical, financial) that are affecting your academic performance, or if you are on academic probation, we invite you to make an appointment to see your academic adviser in BASC. You may schedule an appointment using the website located above.

Master faculty advisers are also available in the department that houses their major, as listed in the catalog, or at the Biology Academic Success Center.

**Peer Advisers.** Peer advisers are College of Biological students who are pursuing, but have not yet completed, a degree at UC Davis. Students may meet with a peer adviser in the BASC on a daily, drop-in basis.

## College of Engineering

Undergraduate Office  
1050 Kemper Hall  
530-752-1979; <http://engineering.ucdavis.edu>  
<http://www.facebook.com/UCDEngineering>

Our mission is to promote your success. The entire advising group in the College of Engineering—department staff and faculty advisers, student affairs officers in the Undergraduate Office, and peer advisers—are here to help you get the most out of your undergraduate engineering education and prepare for a successful career. Questions about Majors, Courses, Holds, Degree Requirements, Dismissals, or Readmission can be addressed to our advising staff. Adviser contact information can be found at <http://engineering.ucdavis.edu/undergraduate/advisors/>.

**Mandatory Advising.** The College has implemented a mandatory advising system, enforced through myucdavis Schedule Builder. You are required to meet with your program adviser once a year, during a specific quarter, which is determined by the first letter of your last name (A-G = Fall; H-N = Winter; O-Z = Spring). Students are notified of the hold by checking Schedule Builder at the time of registration. If you fail to clear your hold during your specified period, you may be unable to make changes to your current registration and to register for future quarters. For more information on mandatory advising, talk to your program adviser or call the Engineering Undergraduate Office at 530-752-1979.

Students seeking information about graduate school preparation or undergraduate research opportunities in engineering can participate in the Gearing up for Grad School (Winter Quarter) seminar series offered by the College of Engineering. Additional advising about graduate school preparation and undergraduate research opportunities is available from faculty or staff advisers in the program in which you are interested and from the Engineering Undergraduate Office or through the Pre-Graduate School advising unit of the Student Academic Success Center at <http://success.ucdavis.edu/grad-profs/index.html>.

**Peer Advisers.** In addition to staff and faculty advisers, peer advisers—current engineering students—are available to advise you on academic and administrative issues. Peer advisers are available in the Engineering Undergraduate Office in 1050 Kemper Hall as well as in some of the departments.

## College of Letters and Science

Undergraduate Education and Advising Office  
200 Social Sciences and Humanities Building  
530-752-0392; <http://www.ls.ucdavis.edu/advising/>

The Associate Dean and staff in the Undergraduate Education and Advising Office can help you with issues relating to your academic goals and experiences. You can consult the Advising Office on matters such as program planning, selection of a major, exceptions to regulations and academic enrichment opportunities. To find answers to your questions and other useful information, including contact information and how to arrange to meet with an adviser, see <http://www.ls.ucdavis.edu/advising/>.

The Undergraduate Education and Advising Office also provides a number of additional services:

- Determines how your transfer credits from other institutions apply towards completion of university, campus, and college requirements for the bachelor's degree. Applicability of transfer credit toward the major is determined by your major faculty adviser
- Performs degree checks to identify remaining university, campus, and college requirements, and certifies graduation
- Acts on petitions requiring the dean's approval
- Works with students who are in academic difficulty or subject to disqualification on intervention strategies to foster success

**Major Advising.** All students who have selected a major have an assigned adviser within that major department or advising cluster. New students should contact their department or program office during the first quarter of residence on the UC Davis campus to meet with their adviser. If your adviser is not available when you need assistance, or if you wish to consult an adviser in a major program other than the one represented by your assigned adviser, contact the department or program office for help.

Continuing students who have completed three quarters in residence in the college should consult with an adviser at certain important checkpoint stages in their academic careers. You are urged, however, to maintain regular contact with an adviser in your major to avoid program errors that may delay graduation. Seniors should maintain close contact with their advisers to ensure that they are meeting the major requirements.

**Undeclared Advising Program.** Students who have not yet selected a major and are undeclared in one of four emphasis areas within the College of Letters and Science are automatically placed in the Undeclared Advising Program which provides academic advising to lower division undeclared students. Undeclared Advising Program students receive academic advising from the Undergraduate Education and Advising Office. They will help you with your academic planning, ensuring progress toward your educational goals and satisfaction of degree requirements.

In addition to the advising services provided in the Undergraduate Education and Advising Office, L&S Peer Advisers staff Residence Hall Advising Team sites in on-campus residence hall areas and are available to Undeclared Advising Program students living in that residence hall complex. Through individual advising, group sessions, and programs, this team will work with you over your first year at UC Davis. They also can assist you in exploring your options before you select your major. Undeclared Advising Program students are required to meet with Letters and Science Advisers in their first and seconds years as long as you remain Undeclared. Students that declare a major within the 90 unit requirement would then be incorporated into the regular Mandatory Advising Program for the College; see below.

**Mandatory Advising in the College of Letters & Science.** Interacting with an academic adviser regularly in your university career can enhance your college success. Our objective is to build a partnership with you to help you achieve your personal and academic goals. Comprehensive advising in Letters and Science is shared between the Undergraduate Education and Advising Office and the major advisers. We are excited to work with you and are here to help you get the most out of your undergraduate experience and prepare for a successful career. More information on the Mandatory Advising program in the College of Letters & Science can be found at <http://ls.ucdavis.edu/advising/academic-advising/mandatory-adv.html>. The mandatory advising program targets the following checkpoints.

**Advising Checkpoints.** At a minimum, you should consult with your faculty or staff adviser at two, possibly three, critical stages in your academic career:

- Before you complete 90 units of degree credit, including transfer work, you must develop in consultation with your faculty or staff adviser, a proposal for a quarter-by-quarter program of courses showing how you will meet your educational goals and graduation requirements. You must also have declared a major by this time. Filing this plan with your adviser does not preclude subsequent modifications of the plan or a change of major.
- When you complete 90 units of degree credit, including transfer work, and have a declared major you are required to request a Degree Check from the Letters and Science Undergraduate Education and Advising Office and should consult your faculty or staff adviser concerning course selection and satisfaction of requirements in the major.

- Before you complete 200 units of degree credit, including transfer work, you must develop in consultation with your faculty or staff adviser, a firm study plan in the form of a quarter-by-quarter program that will satisfy all remaining degree requirements as expeditiously as possible. This plan will be filed with your adviser. If the plan indicates that you will have to register beyond the 225-unit limit in order to meet degree requirements, you must contact the Undergraduate Education and Advising Office immediately. Exceptions to the 225-unit limit are granted by the dean only rarely. Typically, approval is granted only to allow completion of *minimum* degree requirements.

If you have not met with your faculty or staff adviser before these established checkpoints, a hold may be placed on your registration as a reminder.

**Peer Advisers.** Student-to-student advising is an important part of the university advising services. The College of Letters and Science peer advisers are available in the Undergraduate Education and Advising office, in 200 Social Sciences and Humanities Building, and on a weekly basis in the campus residence halls to talk with students about their academic concerns.

## ACADEMIC ADVISING SERVICES

**Academic Peer Advising** 530-752-1736, places Peer Advisers in over 70 departments, Dean's offices or the Biology Academic Success Center to help students find the answers to their questions about major requirements, courses and university regulations. The Academic Peer Adviser complements faculty advising by providing a student perspective. The Academic Peer Advising program is managed by the Academic & First-Year Transition Services office in Student Housing, and the peer advisers are trained by the major departments to provide information and assistance about graduate schools, career opportunities and college requirements.

## Educational Opportunity Program (EOP)

EOP Building  
530-752-9366; <http://eop.ucdavis.edu>

**Educational Opportunity Program (EOP)** offers an array of services to support students both academically and socially. EOP provides a caring and supportive environment for students to meet with peer and staff advisers for help with course selection, registration procedures, campus processes and resources, choosing a major, social challenges and other general advising questions.

Students interested in learning more about EOP may inquire at [eop@ucdavis.edu](mailto:eop@ucdavis.edu) or see <http://eop.ucdavis.edu>.

Visitors are always welcome and no appointment is necessary.

The EOP Guardian Scholars Program (GSP) provides academic and personal support to former foster youth. The program offers services to help students transition to the University and increase their potential to succeed. The staff adviser serves as the liaison between students and various campus units, providing assistance with academic planning, financial aid, housing and other campus resources. The Guardian Scholars office is located in the EOP Building.

## Student Disability Center

54 Cowell Building  
530-752-3184; <http://sdc.ucdavis.edu>

As part of UC Davis' commitment to providing students with disabilities equal access to educational programs, the Student Disability Center (SDC) facilitates academic accommodations and promotes accessibility of instruction and classrooms. SDC advises students on their rights and responsibilities, as well as strategies and tools for managing their disabilities. The SDC specialists assist students with clinically documented disabilities in identifying accommodations needed for their classes. SDC also provides information and guidance to faculty and staff about working with students with disabilities. SDC provides information to current, entering, and prospective students with disabilities about available services, resources, and the accommodations process.

## Student Housing

160 Student Housing  
530-752-1736; <http://housing.ucdavis.edu>

**The First-Year Experience Program** 530-752-4546, is one component of the Student Housing Academic & First-Year Transition Services office, which includes the new student Orientation program and the academic year First-Year Experience Peer Advising program. All first-year and transfer students living in Student Housing and second year students have access to an extensive network of academic support services referred to as the "Residence Hall Advising Team," a partnership between Student Housing, the four Colleges and the Student Academic Success Center. Included are residential Academic Advising Centers, which offer drop-in peer advising provided by peer advisers from the four Colleges and the FYE Program. The peer advisers are able to assist with registration procedures, course selection, choosing a major or other general advising questions. The peer advisers can either answer your questions or put you in contact with others who can. Peer tutors from the SASC provide drop-in tutoring services during the evenings in the Academic Advising Centers for new students enrolling in common first-year courses such as Math, Chemistry, Writing and Statistics. Upper-division students should visit their major department adviser, College Dean's office or the Biology Academic Success Center for academic advising and support services.

**New Student Orientation** 530-752-4443, [orientation@ucdavis.edu](mailto:orientation@ucdavis.edu), <http://orientation.ucdavis.edu>, assists new students and their families with the transition to UC Davis. Orientation includes assistance with academic advising, course registration, information for campus resources and social integration. The staff will introduce you to the campus environment, procedures and opportunities, and offers programs relevant to your changing needs. Your contribution to orientation programs, through ideas and assistance, is always welcome.

## STUDENT CONDUCT AND GRIEVANCES

Office of Student Support and Judicial Affairs  
3200 Dutton Hall  
530-752-1128; <http://sja.ucdavis.edu>

The Office of Student Support and Judicial Affairs (OSSJA) upholds campus standards of academic honesty and student conduct by resolving alleged violations of university policies or campus regulations. OSSJA provides information about campus grievance procedures, provides interpretations of university policy

and regulations and assists with conflict resolution and general problem solving. OSSJA also helps co-ordinate the university's response to distressed or distressing students.

## Misconduct and Discipline

Students enrolling or seeking enrollment in the university have an obligation to act honestly, ethically and responsibly. As members of our academic community and of society at large, students have both rights and responsibilities and are expected to comply with the general law, University policies and campus regulations. Standards for student conduct include but are not limited to the *University of California Policies Applying to Campus Activities, Organizations and Students* and the *UC Davis Code of Academic Conduct*. The UC Davis Administration of Student Discipline explains the student conduct process for reported violations of University policies. These policies may be found on the OSSJA website. In summary, students may be subject to discipline for the following behaviors: academic dishonesty or misconduct; disruption or obstruction of University activities; providing false information, forgery, theft, misuse of any University property, documents or resources; physical assault; threats of violence or conduct that threatens health and safety or is intended to terrorize others; possession of weapons; sexual violence and sexual harassment, including sexual assault, stalking, and dating/domestic violence; possession, use, distribution or sale of drugs or alcohol that is illegal or against University policy; hazing; preparing, selling, or distributing course materials or notes for commercial purposes without the consent of the course instructor; or recording, photographing, or viewing a person in a private location without express consent.

If admitted or found in violation, disciplinary sanctions may range from censure to probation, suspension or dismissal from the university. Additional requirements may include but are not limited to community service, educational programs, or restitution. Suspected violations of campus or university standards by students should be reported to OSSJA. Online reports can be submitted on the OSSJA website.

## Student Responsibilities

Students are responsible for complying with the announcements and regulations printed in this catalog and with all policies, rules and regulations of the university and this campus. Students will not be able to register or receive transcripts of record or diplomas until they have met all university obligations.

## Discrimination/Harassment

If students believe that they have been subject to prohibited discrimination or harassment, they may contact OSSJA at 530-752-1128 or the Campus Chief Compliance Officer at 530-752-9466, for information and assistance. It is important to seek assistance as soon as possible, as time limits may apply to some grievance processes. Advice is also available from the Harassment and Discrimination Assistance and Prevention Program. Individuals may use an Anonymous Call Line at 530-752-2255 or the HDAPP Office at 530-752-9255.

# RESOLVING ACADEMIC PROBLEMS

## Grade Changes

Students who believe they received an incorrect grade due to a clerical or procedural error should ask their instructor to file a Request for Grade Change form with the Office of the University Registrar; see [Retroactive Grade Changes, on page 93](#). If the instructor does not agree, the student should discuss the matter with the chair of the department. If at that point the matter is still unresolved, the student may file a grade grievance with the Grade Change Deputy to the Academic Senate Committee in the Office of the University Registrar in 3100 Dutton Hall. Requests must be made by the end of the following quarter.

The Academic Senate Committee on Grade Changes reviews requests for grade changes and, like the instructor, has no authority to reevaluate student work but can change the grade if it finds a documented clerical or procedural error. In the case of a challenged grade, the student will be expected to bear the burden of proving that a clerical or procedural error occurred and caused the incorrect grade to be assigned. If a student believes that the grading error was the result of prohibited discrimination or arbitrary treatment, the student may file a complaint with the Office of Student Support and Judicial Affairs (OSSJA) in 3200 Dutton Hall. For more information, contact OSSJA at 530-752-1128 or [sja@ucdavis.edu](mailto:sja@ucdavis.edu).

For more details, see the <http://registrar.ucdavis.edu/records/grades/changes.cfm>. See guidelines for the Committee on Grade Changes at <http://academicsenate.ucdavis.edu/GCC>. Questions regarding this process should be directed to the Deputy to the Committee on Grade Changes at [GradeChanges@ucdavis.edu](mailto:GradeChanges@ucdavis.edu).

## Other Academic Problems

If you need a requirement waived or any other type of variance, contact your faculty adviser or the appropriate dean's office or the Biology Academic Success Center for information on your college's procedures. If you cannot get satisfaction through normal channels, contact the ASUCD Student Advocacy Grievance Center or the Committee on Student-Faculty Relationships; see [ASUCD Student Advocacy Grievance Center](#), below.

## ASUCD Student Advocacy Grievance Center

349 Memorial Union  
530-754-4131/6101/3339

The ASUCD Student Advocacy Grievance Center advocates students' academic and nonacademic concerns to the faculty and administration. Grievance counselors assist students one-on-one, directing them to appropriate channels through which to state their academic grievances (e.g., student-faculty relations, sexual harassment, grade change problems, pre-judicial treatment in the classroom and problems with academic procedure and policy) and nonacademic grievances (e.g., campus facilities, campus safety, ASUCD and any other nonacademic concerns). All information discussed between counselors and students is completely confidential. Students can get counseling, referrals and support to aid in the resolution of these matters.

## STUDENT ACADEMIC SUCCESS CENTER

### Academic Assistance and Tutoring

2205 Dutton Hall  
530-752-2013; <http://success.ucdavis.edu>

At the Student Academic Success Center, you can receive academic support with study skills, biology, chemistry, economics, math, physics, and statistics classes. Assistance is also available for writing essays and term papers, reading efficiency, learning English as a second language, and reducing test anxiety.

Academic Specialists teach pre and co classes primarily for EOP and STEP students in workload unit courses. These units count toward minimum progress and financial aid eligibility, but do not count toward graduation.

All students can attend subject workshops, instructor office hours in math, chemistry, physics, and statistics. Individual appointments are available for all students who need writing assistance with their course work.

Undergraduate tutors provide drop-in tutoring in BIS, Chemistry, Economics, Math, Physics, Statistics courses, and writing across the curriculum. Students can walk in to ask questions about the subject material, stay to study while an experienced tutor is in the room, or join a problem solving session in the room.

### Educational Opportunity Program (EOP) Services

EOP Building  
530-752-9366; <http://eop.ucdavis.edu>

Educational Opportunity Program (EOP), offers an array of services to help students adapt both academically and socially to the University setting and successfully achieve their educational goals. EOP provides a caring and supportive environment for students to meet with peer and staff advisers and network with other students. Services include:

- Orientation and welcome activities to introduce new students to UC Davis
- First-year seminars
- Summer bridge program
- Academic advising and pre-enrollment assistance
- Personal and social support from trained peers and staff counselors
- General study skills and graduate school preparation advising
- Supplemental instruction in math and science
- Online EOP newsletter
- Guardian Scholars Program (GSP); a support network for former foster youth

### Guardian Scholars Program (GSP)

EOP Building  
530-752-1211

The mission of the Guardian Scholars Program (GSP) is to empower foster youth at UC Davis to reach their potential by providing a community network that supports their academic progress and personal growth. The GSP is a one-stop center where students can get help from professionals who understand the challenges of former foster youth and where students can meet other

students who have a similar background. In addition to the services available through EOP, Guardian Scholars offers one-on-one mentoring with faculty and staff and a network of off-campus resources specifically intended for former foster youth.

### Mentorships for Undergraduate Research in Agriculture, Letters and Science (MURALS)

EOP Building  
530-752-9931

Mentorships for Undergraduate Research in Agriculture, Letters and Science (MURALS) is designed to enrich the research experience of students situationally disadvantaged in their access to graduate school. The program aims to encourage students to further their education beyond the baccalaureate. By working with a faculty mentor, students not only have an opportunity to participate in academic research, but their experience may give them an incentive to pursue graduate work leading to a master's or doctoral degree. Students must be a junior or senior with a GPA of 3.000 and 90 units and meet additional eligibility requirements.

For more information, please see the MURALS website at <http://murals.ucdavis.edu>.

### Transfer Reentry Veterans (TRV) Center

1210 Dutton Hall  
530-752-2200 Transfer Reentry

If you transferred to UC Davis, are a reentry student, the TRV Center is here to serve you. Reentry refers to undergraduate students who are 25 or older, graduate students who are 30 or older, married students or student parents.

If you or your parent(s) served in the U.S. military and you are unsure of what benefits you may be eligible for, the TRV Center can help.

TRV Center services include: drop-in academic peer advising, Osher Reentry Scholarship program, access to the TRV Resource Network, Veteran educational benefit certifications and fee waivers, resources for commuting students, computer access, study space and networking with the community of TRV students through events and activities.

### Pre-Graduate/Pre-Professional Services

South Hall, 1st Floor  
530-752-4475

Pre-Professional/Pre-Graduate School Advising offers individualized advice and information to students interested in admission to professional and graduate schools (law, Masters and Ph.D. programs, etc.) including prerequisite course planning, exam preparation, evaluation of competitiveness and assistance with all aspects of the application process such as writing the personal statement, getting good letters of recommendation, selecting schools/programs and strategies for becoming the most competitive applicant possible. In addition, the program offers small group advising and informative workshops, and hosts visits from admissions officers from various professional schools.

Graduate School and Law School Information Day is held on campus each fall to give students an opportunity to speak with representatives from Universities across the country in preparation for entrance to graduate or law school.

## Special Transitional Enrichment Program (STEP)

2205 Dutton Hall  
530-752-2013

Freshman EOP students are invited to participate in the Special Transitional Enrichment Program (STEP). The program begins in summer and continues through the first two academic years, offering preparatory course work, academic assistance and advising. It helps students adjust academically and socially to the campus by strengthening their learning skills and study habits, and by providing an extensive orientation to campus life.

## Study Skills Assistance

117 South Hall  
530-752-4475

Advising and workshops are offered to help students strengthen skills that have significant impact on college achievement and academic success. Students may attend a workshop or meet with an adviser to get help with time management, test preparation, success strategies, note taking and other study skills. The workshop schedule is available each quarter at <http://success.ucdavis.edu>.

## INTERNSHIPS AND CAREER SERVICES

### Internship Programs

The Internship and Career Center  
2nd Floor, South Hall 530-752-2855;  
<http://icc.ucdavis.edu>

Gain practical skills that will transfer to the workplace. Apply your coursework. Launch your career. Take advantage of hundreds of internships organized through the Internship and Career Center (ICC) or initiate your own. There is literally something for everyone.

An internship may be full time or part time, credit or non-credit, voluntary or paid, depending on your skills, needs and interests and the availability of openings. Internship experiences must emphasize learning and be supervised by a professional. Academic credit is awarded for experiences planned and approved in advance by a sponsoring faculty member. In addition, a student can have their internships recorded on their academic transcript through the Transcript Notation (<http://icc.ucdavis.edu/find/internships/tn.htm>) process available at the ICC.

### The Internship and Career Center (ICC)

2nd Floor, South Hall 530-752-2855;  
<http://icc.ucdavis.edu>

The Internship and Career Center (ICC) works with undergraduate, masters, and Ph.D students, postdoctoral scholars and recent alumni. The ICC can help you identify your abilities and interests and relate them to career options; gain access to practical experience to increase your competitiveness in the job market; and find out how and where to look for employment. Attend ICC workshops on finding an internship or part time job, beginning a job search, developing a resume, networking and preparing for an interview. Resources on these topics are also available at the ICC website.

ICC's Career Resource Manual, available at <http://icc.ucdavis.edu/>, provides resume guidelines, interview tips and employment information. Also available at the ICC website is Aggie Job Link, an

online database of internships, student jobs and career positions that is updated daily. The ICC coordinates employer visits to campus for company information sessions and on campus interviews.

### Masters, Ph.D.s and Postdoc Services

The Internship and Career Center  
2nd floor, South Hall  
530-752-8342

The Internship and Career Center, located in South Hall, provides comprehensive career services for UC Davis Master's and Ph.D. students, and Postdoctoral scholars (MPP).

Career advisers can assist you with all aspects of your career search either within or beyond academia, or both. Our career services include confidential one-to-one advising with individualized review of curriculum vitae (CV), resumes, and cover letters; workshops and panel discussions; recruiting and networking events; and employer information sessions, all specifically designed for advanced degree holders.

If you are exploring an academic career in research or teaching, looking for a non-academic career in industry, government or the non-profit sector, or considering both paths, the ICC has resources that can help.

### Community Service Resource Center

The Internship and Career Center  
1st floor, South Hall  
530-752-3813

If you are interested in providing community service, visit the UC Davis Community Service Resource Center (CSRC) coordinated through the ICC. Volunteering can be a rewarding and satisfying experience that may also improve your qualifications for the job market. A database with information about non-profit agencies and volunteer opportunities locally, nationally and world-wide is available at the Community Service Resource Center website at <http://csrc.ucdavis.edu/find/volunteer/index.htm>.

## ACADEMIC RESOURCES

### UC Davis Study Abroad

International Center, Suite 1120  
530-297-4633; Fax 530-297-4695;  
[studyabroad@ucdavis.edu](mailto:studyabroad@ucdavis.edu)  
<http://studyabroad.ucdavis.edu/>

Study abroad is one of the richest educational experiences a student can have. When students return from study abroad in places like Italy or Hong Kong, they describe their time abroad as an experience that changed their lives. Students study abroad to pursue their academic interests in a global context, to learn a language, to gain practical field work or lab experience, to engage in an international internship, and to add distinction to an application for graduate or professional school.

UC Davis Study Abroad advisers can help students decide which program is best for them, whether to study abroad for a summer, quarter, semester or a full year and when to go abroad (freshman through senior years). UC Davis Study Abroad also provides freshman seminars, advising sessions for new and transfer students, information sessions for particular majors, countries or regions, and financial aid workshops to assist with funding study abroad programs. Staff also advise on programs that have internship

opportunities. UC Davis Study Abroad also administers the Global and International Studies (GIS) minor, which is sponsored by the Humanities Program in the College of Letters and Science.

UC Davis Study Abroad is home to UC Davis Quarter Abroad, UC Davis Summer Abroad, UC Davis Internships Abroad, UC Davis Seminars Abroad and the University of California Education Abroad Program (UCEAP). UC Davis Study Abroad also provides advising for students interested in non-UC “independent” programs and administers the non-UC study abroad leave program, and provides student services for international UCEAP Reciprocal Exchange students.

## **First-Year Seminar Program**

The Grove, Room 1350 (Surge III)  
<http://fys.ucdavis.edu/>  
<http://fys.ucdavis.edu/student/index.html>

The UC Davis First-Year Seminar Program gives first-year students the opportunity to study with faculty members in small groups, meeting in settings more informal than the ordinary classroom. The seminars focus on a current intellectual interest of the faculty member. All seminars emphasize student participation, providing intense intellectual exchange among students and between student and teacher.

## **Mathematics and Science Teaching Program (MAST)**

104 Everson Hall  
 530-754-9621; [mast@ucdavis.edu](mailto:mast@ucdavis.edu); <http://mast.ucdavis.edu>

The UC Davis CalTeach Mathematics and Science Teaching Program (MAST) provides students with opportunities to explore careers in mathematics and science education. Part of the statewide University of California Science and Mathematics Initiative designed to address the critical need for quality science and mathematics teachers, MAST offers seminars on effective teaching practices, active internships in K-12 and UC Davis classrooms, and academic advising.

## **Student Farm**

530-752-7645; <http://studentfarm.ucdavis.edu>

The Student Farm offers students diverse hands-on learning and research opportunities in sustainable agriculture through internships, formal courses (e.g., in organic crop production, sustainable agriculture, environmental education) and research projects. Students grow and sell organic vegetables in the Market Garden, develop diverse horticultural skills in the Ecological Garden, operate and maintain tractors and equipment, make compost, and provide hands-on farm tours for school children. Students may also create specialized projects in related areas. The Student Farm is a part of the Agricultural Sustainability Institute and is located on the west edge of the campus core, near the Rec Pool. The Student Farm is open to all students, regardless of major or background.

## **Undergraduate Research Center**

2300 Student Community Center  
 530-752-3390; <http://urc.ucdavis.edu>

The Undergraduate Research Center serves as central hub to encourage and facilitate faculty-sponsored undergraduate research, scholarship and creative activity by UC Davis undergrad-

uates. These experiences serve as a vehicle to help students understand what it means to attend a premier research university, enhance the quality of students' interactions with faculty, and learn first-hand that knowledge is not just learned, but discovered. Programs and services are available to students in all majors and all class levels, and include advising, coaching, referrals to sponsored research programs and faculty research projects; educational seminars and workshops related to the student researcher's professional development and training; and funding and awards for student researchers.

## **Washington Program**

**Campus Program Office.** The Grove (Surge III), Room 1350, 530-752-6652; <http://washingtonprogram.ucdavis.edu>

**Residential Program Location.** 1608 Rhode Island Avenue, NW, Washington, D.C. 20036

The University of California hosts a system-wide academic and residential program for undergraduate students attending from each of the UC campuses. Housed within the UC Washington Center (UCDC), an 11-story, state of the art facility, convenient to public transportation, and located in downtown D.C., the programs provide undergraduates an opportunity to enrich their education while in residence for one quarter in the nation's capital. The program's principal activities include enrollment in credit-bearing courses, participation in academic internships, and opportunity to explore the many educational, cultural and historical activities in the Washington area.

UCDC is open to undergraduates from all majors who will have upper-division standing by the start of the quarter in which they plan to participate. A GPA of at least 3.000 is recommended for admission although not required. Applicants are also evaluated based on overall relevant experience, a written statement, and letters of recommendation.

The program offers both an 11 week academic year component, where students earn academic credit and continue to be registered as full-time UC Davis students during the quarter in which they participate; and a 10-week summer component with a credit or non-credit option. The academic component includes an internship that requires students to work three to four days per week as interns in think-tanks, museums, Congress, federal agencies, interest groups, trade associations, research institutions, media corporations, or in other organizations related to the interests and objectives of individual students; a research seminar; and an optional upper division course. Courses are taught by UCDC faculty appointed by the various UC campuses, or visiting faculty from the Washington area.

## **STUDENT RESOURCE AND INFORMATION CENTERS**

### **Center for Advocacy, Resources & Education (CARE)**

530-752-3299; [ucdcare@ucdavis.edu](mailto:ucdcare@ucdavis.edu); <http://care.ucdavis.edu>

The UC Davis Center of Advocacy, Resources & Education (CARE) is committed to reducing the incidence and the impact of all forms of sexual violence, including sexual assault, dating and domestic violence, and stalking, within the UC Davis campus community and at the UC Davis Medical Center. CARE staff work to broaden public awareness about the nature of sexual violence

and its impact on people of all genders, to reinforce the necessity of healthy communication, including healthy sexual communication and consent, and to mitigate the trauma of the survivor.

CARE's primary mission is to eliminate all forms of sexual violence using a multi-faceted approach, including primary prevention, education and awareness, and trauma-informed survivor services. CARE provides confidential and supportive advocacy services to students, staff, and faculty who have experienced sexual assault, dating and domestic violence, and stalking. Confidential crisis intervention, problem-solving and advocacy is available to recent survivors and to those working to recover from past incidents. Survivor services may include assistance in understanding rights and reporting options, safety planning, assistance with the campus administrative and criminal justice reporting processes, and assistance with housing, employment, and academic accommodations. CARE also provides short-term intervention and support for friends, family, house mates and co-workers of survivors.

## **Center for Leadership Learning**

1350 The Grove  
530-752-6908; <http://cll.ucdavis.edu/>

The Center for Leadership Learning (CLL) offers a variety of co-curricular programs and activities to help undergraduate students develop their leadership and professional skills. The CLL provides students a unique opportunity to formally learn about leadership and professionalism, while receiving invaluable, hands-on training that will assist them for a lifetime.

The CLL's programs and services are open to all UC Davis undergraduate students and are free of charge. Undergraduates from all majors, class levels, and range of leadership and professional experience are welcome to participate. Students may elect to participate in our quarterly workshops, complete any of our optional certificate programs, attend our special events, or all the above! The CLL embraces all students who wish to enhance their personal and professional lives and they get to choose the level of involvement that works for them!

## **Cross-Cultural Center**

Bruce E. Smail, Director  
Student Community Center, First Floor  
530-752-4287; Fax 530-752-5067;  
[ccc@ucdavis.edu](mailto:ccc@ucdavis.edu); <http://ccc.ucdavis.edu>

The mission of the Cross Cultural Center (CCC) is to foster a community through education and advocacy regarding systematic group oppressions, ethnic and cultural diversity, and establishing an environment of cross-cultural learning and exchange for the entire campus. The CCC advocates for a campus environment free of racism, classism, sexism, heterosexism, ableism, body image oppression, religious/spiritual oppression and any other forms of oppression.

The CCC strives to build an inclusive and welcoming campus community through the annual Culture Days programs that raise awareness and celebrate our cultural diversity. Everyone is invited to share in these programs featuring speakers, workshops, films, entertainment and family events.

The center features much more as well. It is home to Danzantes del Alma, a popular student folklórico dance troupe that celebrates the culture and heritage of Mexico through performances on campus and throughout Northern California. All students are invited to participate and no prior dance experience is required. Peer Edu-

cation and Community Empowerment (PEACE), is a student-to-student train the trainer program dedicated to undoing racism, sexism, homophobia, and to promoting a welcoming, respectful, living and learning environment. It also has an affiliate program for registered campus student organizations called SoDA. Lastly, the center is frequently home to resources from elsewhere on campus, including the College of Letters and Sciences, the College of Engineering, the Internship and Career Center, and the Educational Opportunity Program.

## **Lesbian Gay Bisexual Transgender Queer Intersex Asexual Resource Center**

Elizabeth Coté, Director  
Student Community Center, 397 Hutchison Drive  
530-752-2452; <http://lgbtqia.ucdavis.edu>

The Lesbian, Gay, Bisexual, Transgender, Queer, Intersex, Asexual Resource Center (LGBTQIARC) provides an open and inclusive space and community that is committed to challenging sexism, cis-sexism, genderism, homophobia, biphobia, transphobia and heterosexism. We recognize that this work requires a continued process of understanding and addressing all forms of oppression. We are committed to this process both in our work and in the structure of the Center itself. The LGBTQIA Resource Center promotes education about all sexes, genders and sexualities, as well as space for self-exploration of these identities. The LGBTQIA Resource Center is a dynamic, responsive and collaborative organization that serves UC Davis and the surrounding region by providing a growing spectrum of programs, resources, outreach and advocacy.

The LGBTQIA Resource Center is open Monday-Thursday, 10 a.m.-6 p.m. and Fridays 9 a.m.-5 p.m. (PT).

## **Services for International Students and Scholars (SISS)**

Services for International Students and Scholars  
530-752-0864; [siss@ucdavis.edu](mailto:siss@ucdavis.edu)

Services for International Students and Scholars assists international students, faculty and researchers in gaining and maintaining an appropriate immigration status while at UC Davis. SISS provides orientation and other information and assistance as part of its mission to build a campus community that is fully inclusive of international students and scholars.

All new and transfer international students must attend a special orientation program held just before each quarter begins. The orientation helps new students with immigration regulations and finding campus services and community resources, and is a vital addition to campus and departmental orientation programs. Orientation for new J-1 international scholars is held every two weeks. Students and scholars should report to SISS as soon as possible after arriving in Davis.

## **Estimated Costs for 2016-2017**

International students are responsible for all of their expenses while studying at UC Davis. The expenses include Nonresident Supplemental Tuition, Tuition, room and board and a modest amount for personal expenses. For the 2016-2017 calendar year, we estimate the cost will be \$56,000 (9 months) for undergraduates, and \$55,800 (12 months) for graduate students. Because the exact cost for tuition and fees is not determined until just before

the beginning of the academic year, these are only preliminary figures. This minimum allowance may be increased without advance notice.

## **Women's Resources and Research Center (WRRC)**

North Hall, First Floor  
530-752-3372; <http://wrrc.ucdavis.edu>

The Women's Resources and Research Center (WRRC) promotes gender equity and aspires for a campus where students, faculty, and staff of all genders can thrive. All are welcome to visit the WRRC and learn about gender equity, connect with community, and find resources and support.

The WRRC focuses on four areas:

- Leadership for Gender Equity: Training and skills-building opportunities to develop leaders that promote gender equity across campus, such as the EDGE Peer Education Program, Volunteer Program, Internship Program, and the Women in Science and Engineering Program.

- Community Empowerment: Student-led initiatives and coalitions that foster self-empowerment and strengthen communities, including: Semana de la Xicanx, the Empowerment Conference, International Womxn's Day, Vagina\* Our Stories, and Gender Equity Awareness Week.
- Research & Scholarship: The Joy Fergoda Library houses over 12,000 feminist volumes available to support research efforts. Scholarships are available that encourage critical inquiry of feminisms, intersectional systems of oppression, and equity are also available.
- Resources & Support: Provide information and referrals on a broad range of topics, such as: sexual violence, gender bias, harassment, health, reproductive and sexual health, self-esteem, childcare, and more. Provide confidential support and referrals on topics involving sexual violence.



ACADEMIC INFORMATION

## REGISTERING AT UC DAVIS

### Registration

Office of the University Registrar  
3100 Dutton Hall  
530-752-3639; <http://registrar.ucdavis.edu>

Registration is the way you become a student at the university. To be a continuing UC Davis student, you must register each quarter. Registration includes enrolling in classes, the financial obligation to pay tuition, fees and all other charges on your student account, filing your current address with the Office of the University Registrar, and completing and filing any forms pertaining to your registration status.

If you are a *new* or *reentering* student, you must complete the following:

- Submit a Statement of Legal Residence; see [Residence for Tuition Information, on page 56](#).
- California Health and Safety Code requires first time enrollees who are 18 years of age or younger to provide a statement of immunization status for the Hepatitis B virus prior to enrollment. For more information, see Student Health and Counseling Services (SHCS) at <https://shcs.ucdavis.edu/information/newstudent/hep-b.html>.
- Have a student ID card produced; see the AggieCard website at <http://aggiecard.ucdavis.edu> or information on how to upload your photo and obtain your AggieCard.

New graduate students who have been registered previously at UC Davis as undergraduates are considered to be new students.

**Change of Name.** Your legal name must be on file with the Office of the University Registrar. If your name has changed since the time of your application, please complete the Name Change Form and submit it with the legal documentation for verification to the Office of the University Registrar in 3100 Dutton Hall or use the form at <https://registrar.ucdavis.edu/records/changes-personal-information.cfm>.

**Change of Address.** Be sure to inform the Office of the University Registrar of any change of address. Failure to file your current addresses can result in a hold on your registration. You can update your address using SISWeb; see <http://sisweb.ucdavis.edu>.

### Late Registration

Late registration privileges extend through the 10th day of instruction, but you are assessed a late fee to defray the extra administrative costs. Registration after the deadline is allowed only if action or inaction on the part of the university delays registration. A recommendation from an appropriate administrative unit is required and tuition and registration fees must be paid with cash, cashier's check, credit union check, university check or fee credit.

## ENROLLING IN COURSES

**Online Registration.** Students enroll in courses by using SISWeb; see <http://sisweb.ucdavis.edu> or myucdavis Schedule Builder; see <https://students.my.ucdavis.edu/schedulebuilder/>.

**The Class Search Tool** and other registration information are available at <http://registrar.ucdavis.edu>.

**Undergraduate Registration Priority.** Access to registration is by priority groups. The groups are established according to student class level, as determined by the number of units completed. Undergraduate Class Level is determined as follows:

• Freshman Level	0–44.99 units
• Sophomore Level	45–89.99 units
• Junior Level	90–134.99 units
• Senior Level	135 units and above

You are officially registered in all courses listed on your individual class schedule. Once registered, you are financially liable for all tuition and fees associated with the term and responsible for completing each of the courses. View your class schedule using SISWeb or myucdavis Schedule Builder.

### Adding and Dropping Courses

You can adjust your schedule by adding or dropping courses until the deadlines published in the Quarter Dates and Deadlines calendar at <http://registrar.ucdavis.edu/calendar/>.

The last day to add courses is the 12th day of instruction. The last day to drop courses without dean's permission or fee is the 20th day of instruction, except for those courses designated by departments as 10-day-drop courses. You need to obtain the permission of your dean and pay the processing fee to drop a designated 10-day-drop course after the 10th day of instruction or to drop any other courses after the 20th day of instruction.

See Adding and Dropping Courses, at <http://registrar.ucdavis.edu/registration/schedule-adjustments/add-drop.cfm>, on how to adjust your schedule and what add/drop procedures and fees apply after the published deadlines. The Quarter Dates and Deadlines calendar, at <http://registrar.ucdavis.edu/calendar/>, also lists the course add and drop deadlines.

### Late Add

To add a course after the deadline, but on or before the last day of instruction, you need approval of the department. A processing fee applies to late adds.

### Late Drop

To drop a course after the deadline, but on or before the last day of instruction, you need approval of the dean of your college or school. Graduate students must have their adviser's approval in order to drop courses. A processing fee applies to late drops. Permission to drop courses after the deadline may be granted only in exceptional circumstances.

### Retroactive Drop

Occasionally, in exceptional circumstances, students are allowed to drop a course after the course is completed. Reasons for seeking a retroactive drop are very specific: medical problems, severe emotional difficulties, or recent death or severe illness in the immediate family. Retroactive Drop petitions must also include an explanation as to why the class being petitioned was more affected than other classes completed during the term. Petitions are subject to approval by the Academic Senate Committee on Grade Changes. Petitions for Retroactive Change are available from the Office of the University Registrar and should include a detailed account of the problem, appropriate documentation and an ade-

quate explanation of why an *I* grade or late drop was not taken during the quarter in which the problem occurred. Retroactive drop petitions should be submitted by the student to the instructor of the course, who will then submit the petition on the student's behalf to the Office of the University Registrar. A processing fee is applicable on all retroactive drops.

### Retroactive Add

In some rare circumstances, students are allowed to add a course after the course is completed. Petitions are subject to approval by the Academic Senate Committee on Grade Changes.

Petitions for Retroactive Change are available from the Office of the University Registrar. Each petition must include the reason for the student's failure to add the course during the quarter in which it was offered. Retroactive add petitions should be submitted by the student to the instructor of the course, who will then submit the petition on the student's behalf to the Office of the University Registrar. A course grade must be assigned by the instructor. A processing fee is applicable on all retroactive adds.

## COURSE LOAD

**Expected Progress.** Undergraduate students are expected to graduate in 12 quarters (four years). To do so, students should plan to complete an average of 15 units per quarter (15 units per quarter for 12 quarters totals 180 units). Because occasions arise which prevent students from achieving expected progress towards the degree, the campus has established minimum progress requirements, to which students must adhere.

**Minimum Progress Requirements.** To meet minimum progress, a full-time regular undergraduate is required to maintain an average of at least 13 units passed over all quarters of enrollment. Minimum progress is calculated at the end of every Spring Quarter for the preceding three quarters (Fall, Winter, Spring) comprising the academic year. Undergraduate students falling below this requirement are not in good minimum progress standing and may be disqualified from further enrollment at the University. Quarters for which a student was officially approved for part-time status are omitted from the minimum progress calculation. For more information, see *Probation and Dismissal*, on page 93.

**Certification of Full-Time Status.** Undergraduate students must carry a study load of at least 12 units (including workload units) each quarter in order to be certified as full-time students for insurance and financial aid purposes or to compete in intercollegiate athletics. Graduate students must carry a study load of at least 12 units each quarter in order to be certified as full-time students.

#### Course Load Limits in the College of Letters and Science.

Freshman students in their first year and transfer students in their first quarter of residence may not take more than 17 units each quarter. For all other Letters and Science students, the class schedule may not exceed 21 units each quarter. These unit limitations include non-credit remedial courses and repeated courses, but not make-up work to remove incomplete grades.

**Course Loads in the College of Engineering.** Because of the large number of required units in engineering programs, many students must take more than 15 units per quarter and/or attend summer session to finish in four years.

### Part-Time Student Status

If, for reasons of occupation, family responsibility, health or, graduating-senior status (one term only), you are unable to attend the university on a full-time basis, you may qualify for enrollment in part-time status. Undergraduate students must file for part-time status each quarter. Graduate students with approved part-time status will remain part-time until the student enrolls full-time. To be considered eligible, undergraduate students must be registered in 10 units (including workload units) or fewer by the tenth day of instruction that quarter and graduate students must be registered in 6 units or fewer by the tenth day of instruction. The Part-Time Petition is available through the Office of the University Registrar at <https://registrar.ucdavis.edu/registration/part-time.cfm>. The petition must be submitted no later than the tenth day of instruction. Minimum progress requirements are waived for part-time students. Part-time students have use of the same facilities and are eligible for the same services, including student health services, as full-time students.

## THE MAJOR

You will find a complete list of the majors offered at UC Davis under [Degrees Offered by UC Davis, on page 15](#).

### Declaration of Major

**College of Agricultural and Environmental Sciences.** Students must declare a major by the time they have completed 90 units. Failure to declare a major at this point may result in a hold on further registration. In order to declare a major, you must meet with your faculty adviser and/or advising associate, fill out a Change of Major petition on the OASIS portal at <https://students.ucdavis.edu/>, and then file the petition with the dean's office. If you have completed 90 units, you must prepare a study plan with your adviser and/or advising associate at the same time. You are accepted into a major only after your major department and the dean's office have approved the Change of Major petition. With the approval of the College Executive Committee, additional requirements, such as completion of a particular set of required courses with a specified grade point average (usually well above a C average), may be introduced as conditions for acceptance into any major at any time.

**College of Biological Sciences.** Students must declare a major by the time they have completed 90 UC Davis units. A hold will be placed on registration if a student is still undeclared after completing 90 units. Students must meet with a BASC academic adviser for that specific major, review eligibility and discuss a projected plan of studies. Students file a Change of Major petition on the OASIS portal at <https://students.ucdavis.edu/>. The minimum requirement for entry into a major is a C average in all courses used to satisfy major requirements. Students are accepted into the major when their adviser and the dean have approved the petition.

Students who fail to maintain a 2.000 GPA in courses required for their major over two consecutive quarters may be required to withdraw from the major.

**College of Engineering.** Students must declare a major when they apply to the College of Engineering. The ability to change majors is subject to meeting the requirements set forth by the faculty of the College of Engineering. Requirements for changing to a College of Engineering major can be found at <http://engineering.ucdavis.edu/undergraduate/advising/answers.html#a1> or by contacting the Engineering Undergraduate Office 530-752-1979.

**College of Letters and Science.** Students must declare a major by the time they have completed 90 units. If you have not declared a major by this point, a hold may be placed on your registration. Such a hold would be removed only when your Change of Major petition is approved by the Undergraduate Education and Advising Office. Petitions are only accepted electronically and are available on the “Forms and Petitions” tab on the OASIS portal at <https://students.ucdavis.edu/>. As a part of the declaration procedure, you must, in consultation with a faculty adviser, prepare a projected plan of study. You are accepted into the major when your adviser and the Undergraduate Education and Advising Office have approved the petition.

To be accepted into a major, you must have a *C* average in all courses you have completed that are required for that major. With the approval of the College Executive Committee, additional requirements, such as completion of a particular set of required courses with a specified grade point average (usually well above a *C* average), may be introduced as conditions for acceptance into any major at any time.

If your performance is unsatisfactory after you have declared a major program, you may be required by the dean to withdraw from that major, upon written recommendation from the chair of the department or the curriculum committee that administers the major.

### Change of Major Within a College

To change from one major to another within a college, you need the consent of the department or committee in charge of your proposed new major and the approval of the dean. Admission into a major program may be denied by the program or by the dean if your grade point average (GPA) in courses required for the selected major is less than 2.000.

Procedures for change of major within a college are the same as for declaration of major and the same conditions apply. If you wish to change to a major that has admission restrictions, you must comply with the special procedures and requirements for that major.

Except under unusual circumstances, no change of major will be permitted after you attain senior standing (135 units). Students wishing to petition for such an exception should consult in advance with the relevant dean's office or the Biology Academic Success Center regarding additional restrictions and requirements.

It is not possible to change or declare a major in the quarter in which you file to graduate.

**College of Biological Sciences.** Students who wish to change their major after completing 135 units should file a quarter-by-quarter graduation plan with the change of major petition, both available on the OASIS portal at <https://students.ucdavis.edu/>. Changes of major will not be permitted by the Dean after the beginning of the quarter of the student's graduation. Students whose graduation plan causes them to exceed 200 units must also file an Excess Units petition available on OASIS.

**College of Engineering.** The above provisions may not apply to students in the College of Engineering, whose freedom to change majors is limited. Requirements for changing to a College of Engineering major can be found at <http://engineering.ucdavis.edu/undergraduate/advising/answers.html#a1> or by contacting the Engineering Undergraduate Office 530-752-1979.

### Change of Major Accompanied by Change of College

A change of major petition, available on the OASIS portal at <https://students.ucdavis.edu/>, must be approved by a faculty or staff adviser of the new major you are selecting. In addition, admission to the new college will require that dean's approval. To obtain that approval, you must be in good academic standing (qualitatively and quantitatively; see the [Probation and Dismissal, on page 93](#)), meet all minimum GPA criteria, including those for the major, and satisfy any other admission requirements established by the new college.

Except under unusual circumstances, no change of major will be permitted after you attain senior standing (135 units). Students wishing to petition for such an exception should consult in advance with the relevant dean's office or Biology Academic Success Center regarding additional restrictions and requirements.

It is not possible to change or declare a major in the quarter in which you file to graduate.

**College of Biological Sciences.** Students who wish to change their major and college after completing 135 units should file a quarter-by-quarter graduation plan with the change of major petition, both available on the OASIS portal at <https://students.ucdavis.edu/>. Students whose graduation plan causes them to exceed 200 units must also file an Excess Units petition available on OASIS. Changes of major will not be permitted by the Dean after the beginning of the quarter of the student's graduation.

**College of Engineering.** Requirements for changing to a College of Engineering major can be found at <http://engineering.ucdavis.edu/undergraduate/advising/answers.html#a1> or by contacting the Engineering Undergraduate Office 530-752-1979.

**College of Letters and Science.** Requirements for changing to a College of Letters and Science major can be found at <http://www.ls.ucdavis.edu/advising/faq.html>.

### Multiple Majors

**College of Agricultural and Environmental Sciences.** A student choosing to major in multiple majors must petition the departments/programs/divisions responsible for the major(s) and the dean of the college. The dean's approval of declaration for multiple majors is subject to the following:

1. Eighty percent of the upper division units offered in satisfaction of course and unit requirements of each major must be unique; that is, they may not be offered in satisfaction toward the upper division unit requirements of any of the other selected majors. Courses with substantial overlap in content will not count as part of the eighty percent. Departmental advisers may approve only one course for substitution when considering the eighty percent in upper division courses and units required for each major.
2. When unit requirements of the majors included in a request differ, the major with the smaller number of upper division units required should be used to compute the minimal unit difference that must be met.

3. A student in good academic standing and with a minimum of a C average in the upper division courses taken toward the major may elect to declare simultaneously more than one major within the college or a combination of majors offered by the college and other undergraduate colleges on campus.

**College of Biological Sciences.** Admission into multiple majors is subject to the approval of offices in charge of the majors involved and the Dean of the College. Departments, curriculum committees and other teaching units, singly or collectively, as well as faculty advisers have the right to disapprove a student's request for a multiple major.

Approval of a request to declare more than one major is subject to the following:

1. Eighty percent of the upper division units used to satisfy requirements in each major must be unique; that is, they may not be offered in satisfaction of requirements of any of the other majors involved.
2. If the major programs differ in the number of upper division units required, the major program requiring the smaller number of upper division units will be used to compute the minimum number of units that must be unique.
3. In determining that the eighty percent requirements have been satisfied, advisers and the Dean must count both specific courses and courses with substantial overlap of content as common to the majors involved.
4. Students must complete all majors within the 225-unit limit.
5. Students may only petition for a multiple major after completing two Depth Subject Matter courses in each major.

A student who completes all requirements for approved multiple majors in which one major normally leads to an B.A. degree and another normally leads to a B.S. degree, will receive a B.A.S. degree. A single degree is granted to students who graduate with multiple majors.

**College of Engineering.** Students may choose to complete two engineering majors. Double-major students must satisfy the requirements for both majors. Degree requirements for such double majors ordinarily cannot be completed within four academic years. A change of major petition is required for all requests and appropriate approvals from all applicable departments and dean's offices are necessary.

The Department of Computer Science **does not allow** double majors of Computer Science and Engineering and Computer Engineering, or Computer Science and Engineering and Electrical Engineering, or Computer Science and Engineering and Computer Science (L&S).

Triple majors will not be approved.

If you want to double major in any over-subscribed engineering major, you will be subject to the additional restrictions for changing into those majors and must satisfy the requirements of both majors.

**College of Letters and Science.** Students choosing to major in multiple subjects must notify the Undergraduate Education and Advising Office of their decision by submitting for approval a petition endorsed by faculty advisers in the majors. The dean's approval of the declaration of more than one major is subject to the following conditions:

1. At least 80 percent of the upper division units used to satisfy course and unit requirements in each major selected must be unique and may not be counted toward the upper division unit requirements of any other major undertaken. Courses with substantial overlap in content will not count as part of the 80 percent.

If the major programs differ in the number of upper division units required, the major program requiring the smaller number of units will be used to compute the minimum number of units that must be unique.

2. At the time of request, a substantial part of the preparatory subject matter in each major must have been successfully completed.
3. All degree requirements must be completed within the 225-unit limit.

Combination proposals that *cannot be approved* are two or more majors offered by the same discipline, *except* art history and art studio.

A student who completes all requirements for approved multiple majors in which one major normally leads to an A.B. degree and another normally leads to a B.S. degree, will receive a B.A.S. degree. A single degree is granted to students who graduate with multiple majors.

## Cross-College Majors

**College of Agricultural and Environmental Sciences.** The College does encourage multiple majors between colleges whenever your academic interests and abilities indicate this to be the best route. After endorsement of the Change of Major petition by the appropriate faculty or staff adviser in the colleges involved, each dean may approve the petition if there are sufficient differences between the requirements for the major programs you wish to study.

At least 80 percent of the upper division units used to satisfy course and unit requirements in each major selected must be unique and not duplicate those of the other major. In planning for multiple majors, you should determine the total requirements needed for each major as well as for graduation from each college involved.

All degree requirements must be completed within the 225-unit limit.

The same conditions apply for cross-college majors as for multiple majors.

**College of Biological Sciences.** The same conditions apply for cross-college multiple majors as for multiple majors within the college. In addition, approval of the deans of all involved colleges are required for cross-college multiple majors.

**College of Engineering.** Enrollment in a combination of an engineering major and a non-engineering major may be possible. A change of major petition is required for all requests and appropriate approvals from all applicable departments and deans' offices are necessary. Such double-major students must satisfy the requirements for both majors. Degree requirements for such double majors ordinarily cannot be completed within four academic years.

**College of Letters and Science.** The same conditions apply for cross-college majors as for multiple majors. Cross-college programs will not be approved if the majors involved are available within a single college as well.

## Individual Major

Students with academic interests not covered by an established major have the opportunity to develop an individual major. Such a major requires the selection of interrelated courses totaling a minimum of 45 upper division units from two or more areas of study. If you choose this option you will work closely with faculty advisers to develop a coherent and rigorous academic program. This program is then submitted to a faculty committee for review and approval. Submit the proposed program to the committee prior to reaching 90 units, or by the fourth full week of the fifth quarter before graduation, whichever is earlier. If you wish to undertake an individual major, see an adviser in your dean's office or the Biology Academic Success Center. Program requirements are outlined under [Individual Major, on page 379](#). *The College of Engineering does not offer an individual major. The College of Agricultural and Environmental Sciences has suspended this program.*

## THE MINOR

If you are interested in two or more areas of study, you should consider completing one or more minor programs. Minor program requirements are listed in the chapter of this catalog under the department that offers them. You will find a complete list of the minors offered at [Minor Programs Offered by UC Davis, on page 17](#).

A minor typically consists of 18 to 24 upper division units in courses specified by the department or program offering the minor. Courses used to satisfy the requirements of a minor, including those completed elsewhere, must be approved by an adviser in the sponsoring department or program. You are also expected to complete all courses that are prerequisite to the upper division courses required for the minor.

When unique subject matter essential to the academic coherence of the program is offered only at the lower division level, the program may include a single lower division course as part of the minor in lieu of an equal number of units in the upper division courses.

For successful completion of a minor, **you must have a grade point average of 2.000 in all courses required for the minor.**

If you want to have completion of a minor certified on your transcript, you must file a minor petition on the OASIS portal at <https://students.ucdavis.edu/>. Requirements for the minor must be met by the time of graduation.

## Additional Requirements for Colleges

### College of Agricultural and Environmental Sciences

Transfer units will not normally be used to satisfy minor requirements. Exceptions will require approval by the student's adviser and the Undergraduate Majors and Courses Committee.

No more than one course applied to the satisfaction of requirements in the major program shall be accepted in satisfaction of the requirements of a minor. No course used to satisfy the requirements of one minor shall be applied toward any other minor.

### College of Biological Sciences

Students in the College of Biological Sciences may not complete a minor in the same field as the student's major. This includes any minor offered by the department or curriculum committee in charge of the student's major. All major and minor requirements must be completed within the 225 total unit limit.

No more than one course applied to the satisfaction of requirements in the major program shall be accepted in satisfaction of the requirements of a minor. No course used to satisfy the requirements of one minor shall be applied toward any other minor.

### College of Letters and Science

With the exception of interdisciplinary minors approved by the College Executive Committee, students in the College of Letters and Science may not complete a minor offered by the department or program in charge of the student's major. You can elect only one minor in a subject area.

No more than one course applied to the satisfaction of requirements in the major program shall be accepted in satisfaction of the requirements of a minor. No course used to satisfy the requirements of one minor shall be applied toward any other minor.

## Requirements for Schools

Beyond minors offered by the undergraduate colleges, there are two additional minors available for undergraduate students. The School of Education offers a minor in Education and the Graduate School of Management offers a minor in Technology Management and. The process for declaring these minors is the same, students file a minor petition on the OASIS portal at <https://students.ucdavis.edu/>.

### School of Education

Any student may minor in Education.

### School of Management

The Graduate School of Management offers the minor in Technology Management. To complete the minor, students must complete a minimum of 20 units of coursework in the minor with a GPA of 2.000 or better. Coursework in the minor will complement the student's undergraduate major studies with training in accounting, finance, marketing, organizational behavior and operations. The minor also provides students with business and management skills that will enable them to apply training from their major program in a business setting.

## ACADEMIC CREDIT

### Units of Credit

Academic work at the university is measured by "units of credit." In conjunction with the letter grade you receive from the course instructor, units of credit give a fairly accurate evaluation of the amount of time you have devoted to a given subject. Units of credit also make it possible to anticipate the amount of work involved in a particular course and enable you to transfer from one campus or university to another without undue difficulty. To convert quarter units to semester units, multiply by 0.66; from semester to quarter units, multiply by 1.5.

Units of credit are assigned to courses based on 1 unit of credit for three hours of work by the student per week. Usually this means one hour of lecture or discussion led by the instructor and two hours of outside preparation by the student. In laboratory courses, two or three hours of work in the laboratory are normally assigned 1 unit of credit.

In most courses at UC Davis, the standard procedure prevails, so that a 3-unit course meets for three hours a week, a 4-unit course for four hours and so on. Courses that are an exception to this pattern may require additional class time or give more demanding assignments. If you have questions about the number of units assigned to a course, you should check the expanded course descriptions (available at your college, department, or on the Internet) or ask the instructor what is required in terms of outside reading, term papers, problem sets or field trips. These are not always spelled out completely in the *General Catalog*. By knowing the amount of work that will be required, you can plan your course load more systematically and realistically.

### Credit by Examination

Under certain prescribed conditions, currently registered students in good standing may receive course credit by taking an examination without formally enrolling in a course. You may obtain a petition and a copy of the prescribed conditions from the Office of the University Registrar. The petition is subject to the approval of the instructor giving the examination and the department involved.

The completed petition, accompanied with the processing fee, must be presented for final approval to the dean of your college or school, or if you are a graduate student, to the dean of Graduate Studies. The completed petition must be submitted to the Office of the University Registrar no later than the business day before the date of the scheduled examination; petitions that are submitted after this date will be denied. Students who are approved by the Office of the University Registrar to take credit by examination shall be issued a permit to take the examination, which the student will present to the instructor at the time of the examination.

The credit received for the examination may not duplicate any credit you have already earned toward your degree. You may not use credit by examination to repeat any course you have taken previously, regardless of the grade you received in that course. Credit earned by examination may not be applied towards satisfaction of the General Education requirement. The final examination results will be reported to the Office of the University Registrar, which will assign the appropriate grade and grade points to you. Since failure to pass the examination will be recorded as an *F*, you are encouraged to prepare fully for such an examination before attempting it. Optional *P/NP* or *S/U* grading is subject to approval by the appropriate dean.

You may also receive credit for learning in nonacademic settings through credit by examination.

To earn credit through the credit by examination process, the examination must be given by a UC Davis instructor and be for a course listed in the current *General Catalog*. Students are not eligible to take a credit by examination in a quarter in which they are not currently enrolled.

### Concurrent Credit from Another Institution

A student may not obtain transfer credit for courses taken at a non-University of California campus in a term during which the student is registered as a full-time student at UC Davis. A variance can be obtained only by petitioning the dean of your college well in advance of the desired registration. When a variance is granted, units earned are counted toward minimum progress for the term in which the dual registration occurs. Summer Session courses are exempt from this regulation.

Students may gain credit for courses taken during the summer at other institutions, provided the courses parallel those given in the University of California. Assurance that such credit will be accepted, however, can be given only after the courses have been completed. You should arrange to have the transcripts of your Summer Session grades sent to Undergraduate Admissions for evaluation.

### Intercampus Visitor Program

Qualified undergraduates may take advantage of educational opportunities on other University of California campuses as an Intercampus Visitor (ICV). This program enables students who have completed at least one year in residence on their home campus and have maintained a grade point average of at least 2.000 to take courses not available on their home campus, to participate in special programs, or to study with distinguished faculty members on other campuses of the university. Students who meet the above requirements should complete an application available in the Office of the University Registrar or at <http://registrar.ucdavis.edu>.

### Summer Sessions

1350 Surge III  
530-752-7622; <http://summer-sessions.ucdavis.edu>

Every summer, many students earn units, complete their undergraduate degrees, expand their knowledge, do research, take special study courses, meet prerequisites or take courses that are often over-enrolled during the academic year by participating in Summer Sessions at UC Davis. Per unit course fees are equivalent to academic year tuition based on the standard 15-unit quarter.

Summer Sessions offers more than 600 lower and upper division course sections in a wide range of subject areas that provide full university credit transferable to most campuses. Since admission is open to virtually all adults, Summer Sessions traditionally attracts students from US and international universities and colleges, high school graduates and many other qualified applicants. Admission to a summer session, however, does not guarantee or imply admission to the university's regular academic quarters.

Summer offerings include Special Sessions that either occur off-campus or take place outside the normal six-week terms.

Summer Sessions dates are listed at the bottom of the *Academic Calendar*, on page 1, and at <http://summer-sessions.ucdavis.edu>.

## **UC/CSU/Community College Cross Enrollment**

If you are interested in taking a particular class at a nearby California State University or community college campus, you may now do so through the Intersegmental Cross Enrollment program.

Enrollment is limited to one course per term and participating students need the approval of both the home and the host campus. Please note that the Los Rios Community College district is not participating in the program.

Senate Bill 361 requires that UC, CSU and the California Community Colleges permit students to enroll in one course per term at a campus of either of the other two systems on a space available basis at the discretion of the two campuses. This program aims to encourage community college students to enroll concurrently in courses offered at local universities, potentially increasing the number of community college transfers, including students from underrepresented groups.

Students must meet certain qualifications and be certified by their home campus as to eligibility, residence, fee, financial aid and health status. Generally, students will be allowed to add a class, if space is available, after the add/drop period on the host campus. To add a course, students must obtain the faculty member's approval and signature on a Cross-Enrollment form, available at their home campus Registrar's Office. The student takes the signed form to the Registrar's Office at the host campus for processing. If you are interested in participating, come to the Office of the University Registrar in 3100 Dutton Hall for more information.

## **Open Campus (Concurrent) Program**

UC Davis Extension  
1333 Research Park Drive  
800-752-0881 or 530-757-8777  
<https://extension.ucdavis.edu/open-campus>

Most of the classes taught at UC Davis are available to members of the public through the Open Campus (Concurrent) Program on a space available basis. The enrollment limitations, deadlines and fee schedule are provided in the Open Campus brochure-available online, by mail or from the UC Davis Extension office. Students previously registered at UC Davis who have not graduated may not enroll through Open Campus (Concurrent) until twelve months after withdrawing from UC Davis except with permission of the student's College Dean's Office or the Biology Academic Success Center. Upon admission or readmission to regular student status at UC Davis, the units and grade points earned when enrolled in Open Campus courses will count toward both the 180-unit undergraduate degree requirement and the UC GPA.

## **UC Davis Extension**

1333 Research Park Drive  
800-752-0881 or 530-757-8777  
<http://www.extension.ucdavis.edu/>

As the outreach arm of UC Davis, UC Davis Extension provides continuing education in numerous professional and academic fields. Details on Extension courses are available by visiting the Extension website, calling or coming to the Extension office. Students enrolled at UC Davis who wish to use UC Davis Extension courses, other than those offered through Open Campus (Concurrent), towards degree requirements must obtain written approval from the dean's office of their college or the Biology Academic Success Center before enrolling in the Extension courses. Upon approval students may apply a limited number of credits towards the undergraduate or graduate degree requirement.

## **EXAMINATIONS**

### **Midterms**

In undergraduate courses for which a midterm examination is required, each student has the right to take the midterm (or submit the take-home examination as opted by the instructor) during one of the regularly scheduled meetings of the class. The scheduling of a midterm examination at a time other than a regularly scheduled class meeting requires mutual written consent of the instructor and each student registered in the course. A student who does not consent in writing to the different time must be permitted to take the examination (or submit the take-home examination) at the officially scheduled time. A student who consents in writing to the change of examination time waives the right to take the midterm at the officially scheduled time.

### **Final Examinations**

**Scheduling.** The quarterly final examinations schedule is listed at <http://registrar.ucdavis.edu/registration/schedule/finals.cfm>. Exams are set according to the day-and-start time of the classes offered during the quarter. This information is available so that you can avoid final examination conflicts. A student who has multiple exams on the same day may discuss the situation with the instructors of the courses. **Students are responsible for ensuring they do not have conflicting exams. There is no regulation mandating a change.**

**Requirements.** Except under certain specified circumstances, Academic Senate Regulations require that final examinations be given in all undergraduate courses. Final examinations may be given in graduate courses. Exceptions to the regulation would be independent study courses, courses that consist of laboratory work only and courses in which the examination has been waived by the Academic Senate Committee on Courses of Instruction.

At the instructor's option, the final examination in any course other than an on-line course may be wholly or in part of the take-home type. All examinations for on-line courses must be proctored to ensure that the person taking the examination is the student receiving credit. The writing time (in undergraduate courses) of a take-home and an in-class final examination together should not exceed three hours. In each course in which a final examination is required, the students have the right to take the final examination (and/or submit the take-home examination) at the time and on the date published in the quarterly final examinations schedule at <http://registrar.ucdavis.edu/registration/schedule/finals.cfm>.

An instructor may release each student's original examination, or a copy, at any time. Otherwise, the instructor will keep the exams, or copies thereof, until the end of the next quarter and students may pick up their exams during this period.

For on-line courses, the instructor of each on-line class will be provided the option to have the final in any of the TBA slots or at a time on dead day. Students shall be notified of the time and place of the final on or before the first day of instruction.

**Changing a Final Examination Date.** An in-class final examination may not be rescheduled for a date earlier than the first day of finals week. The due date for a take-home final examination may not be rescheduled for a date earlier than the first day of finals week. The scheduling of an examination at a time other than the specified time requires the written mutual consent of the instruc-

tor and each student involved in the change. Any student who does not consent in writing to a different time will be permitted to take an examination (or submit the instructor-opted take-home examination) at the officially scheduled time. A student who consents in writing to a change in the final examination time waives the right to take the examination as originally scheduled. Departures from the published examination schedule should be carried out so as not to disadvantage students who are unable to accept the changed schedule.

A student who is improperly denied the right to take a required final examination on the published date (or submit the take-home examination as opted by the instructor) may file a petition with the Executive Council of the Davis Division of the Academic Senate by the end of the next regular term for appropriate action.

**Disabilities.** Students with documented disabilities may be entitled to in-class accommodations. The student shall provide the instructor with a letter from the Student Disability Center (SDC) recommending those academic accommodations that the instructor is responsible for providing. Students must request accommodation as soon as possible, to allow the university reasonable time to evaluate the request and offer necessary adjustments. No accommodations shall alter the nature of the academic demands made of the student nor decrease the standards and types of academic performance, nor require facilities or personnel that cannot reasonably be provided. SDC coordinates with the Office of the University Registrar to reserve a classroom for examinations for students with documented disabilities during finals week. The instructor should consult with the student and SDC on any questions or concerns.

**Religious Observances.** UC Davis seeks to accommodate any student who, in observance of a religious creed, encounters an unavoidable conflict with a test or examination schedule. The student is responsible for providing, in writing no later than the beginning of the quarter, notification of a potential conflict to the individual responsible for administering the examination and requesting accommodation. Instructors will consider such requests on a case-by-case basis and determine whether such conflicts can be resolved without imposing on the instructor or the other students in the class an undue hardship, which cannot be reasonably avoided. If so, the instructor will determine, in consultation with the student, a time during which the student can take the test or examination without incurring a penalty or violation to the student's religious creed.

## GRADES

Every instructor is required to assign a grade for each student enrolled in a course. The following grades are used to report the quality of a student's work at UC Davis:

A	Excellent
B	Good
C	Fair
D	Barely passing
F	Not passing (work so poor that it must be Repeated to receive recognition)
P	Passed (grade C- or better)
NP	Not passed
S	Satisfactory
U	Unsatisfactory

I	Incomplete (work is satisfactory but Incomplete for a good cause)
IP	In progress

The grades A, B, C and D may be modified by a plus (+) or minus (-).

## Grade Points

Grade points are assigned each letter grade as follows:

A+ = 4.000	B- = 2.700	D = 1.000
A = 4.000	C+ = 2.300	D- = 0.700
A- = 3.700	C = 2.000	F = 0.000
B+ = 3.300	C- = 1.700	P/NP = n/a
B = 3.000	D+ = 1.300	S/U = n/a

## Grade Point Average (GPA)

The grade point average is computed on courses taken at the University of California. The value of grade points over units attempted determines your grade point average. The grade point balance represents the number of grade points above or below a C average. The grades IP, P, S, NP and U carry no grade points and are not included in grade point computations. Incomplete (I) grades are not included in the GPA at the end of the quarter, but are counted as F in determining if a bachelor's degree candidate has earned the minimum 2.000 GPA required for graduation.

A student at UC Davis is expected to maintain a C (2.000 GPA) or better in all work undertaken in the university. If you fall below a C average, you are considered "scholastically deficient," see [Probation and Dismissal, on page 93](#).

## Passed/Not Passed (P/NP) Grading

Subject to regulation by the faculties of the colleges and schools, an undergraduate student in good standing may request to take specific courses on a Passed/Not Passed basis. Such requests must be submitted and confirmed before the 25th day of instruction.

The grade P is assigned for a grade of C- or better. Units thus earned are counted in satisfaction of degree requirements but are not counted in determining your grade point average.

The intent of this option is to encourage exploration in areas in which you have little or no previous experience by alleviating grading pressures. The maximum number of units graded P that will be accepted for degree credit is one third of the units completed in residence on the UC Davis campus. Consequently, at least two thirds of the units completed in residence at UC Davis and presented in satisfaction of degree requirements must be in courses taken for a letter grade.

In specific approved courses, instructors will assign only Passed or Not Passed grades. Such courses count toward the maximum number of units graded P allowable toward the degree. If you are planning to take courses on a P/NP basis, you should also familiarize yourself with the requirements of your particular school or college, which may have placed conditions or restrictions in addition to the university requirements. If you plan to attend graduate or professional school, you should consult with Pre-Graduate/Pre-Professional Advising Services and Health Professions Advising regarding Passed/Not Passed grading.

If you elect the *P/NP* grading option for courses graded upon completion of a two- or three-quarter sequence (in-progress grading), a petition must be submitted before half of the time covered by the *IP* grading has elapsed. The *P/NP* grading will then be in effect for the entire course sequence.

If you receive a *D* or an *F* in a course, you may not repeat it using the *P/NP* option. If you receive an *Incomplete* in a course you took for a letter grade, you may not complete the course on a *Passed/Not Passed* basis.

**College of Agricultural and Environmental Sciences.** The *Passed/Not Passed* option should be used only for elective courses, not for courses taken to fulfill major requirements. An *NP* grade in a course required by the major could prevent graduation. When in doubt, check with your faculty adviser before electing to take a course on a *Passed/Not Passed* grading basis.

**College of Biological Sciences.** All courses used to satisfy major requirements must be taken on a letter-graded basis, unless courses are only offered on a *Passed/Not Passed* basis. Courses taken before Fall 2006 on a *Passed/Not Passed* basis will be accepted in fulfillment of major requirements.

**College of Engineering.** Students enrolled in any undergraduate major within the College of Engineering may not exercise the *Passed/Not Passed* option for any coursework used toward satisfaction of course or unit requirements for the degree. Courses offered only on a *P/NP* basis (e.g., Engineering 199s) are acceptable for specific program area degree requirements. Students wishing to exercise the *P/NP* option for coursework which is not being used to satisfy course or unit requirements may submit a *P/NP* petition by visiting the Engineering Undergraduate Office in 1050 Kemper Hall.

**College of Letters and Science.** Students in the College of Letters and Science are subject to an additional limitation on the number of units that may be completed employing the *Passed/Not Passed* grading option; see *Bachelor's Degree Requirements* for the college in the *Undergraduate Education* chapter. Graduating seniors and other students planning to undertake graduate or professional studies, should consult an adviser before electing for *Passed/Not Passed* grading in courses required for the major program.

### Satisfactory/Unsatisfactory (S/U)

The grade of *S* is awarded to graduate students for work in graduate courses that otherwise would receive a grade of *B-* or better and for work in undergraduate courses that otherwise would receive a grade of *C-* or better.

Graduate students, under certain circumstances, may be assigned grades of *S* or *U*, but units earned in this way will not be counted in calculating the grade point average. Petitions to elect *S/U* grading are available from the Graduate Studies Office and must be signed by your graduate adviser. Prior to advancement to candidacy, graduate students may petition to take no more than one course per quarter on an *S/U* grading basis. Doctoral students who are advanced to candidacy and master's students who have completed all the courses included on their program of study and advanced to candidacy may, with the approval of the Graduate Adviser and the Dean of Graduate Studies, take an unlimited number of courses on an *S/U* basis including courses offered by student's major program. A graduate course in which a *C*, *D* or *F* grade is received may not be repeated with the *S/U* option.

In specific approved courses, instructors will assign only Satisfactory or Unsatisfactory grades. Such courses count toward the maximum number of units graded *S* allowable toward the degree, as specified by each degree program.

### In-Progress (IP) Grading

For a course extending over more than one quarter (designated "deferred grading only, pending completion of sequence" in course descriptions), evaluation of student performance is deferred until the end of the final quarter. Provisional grades of *IP* are assigned in the intervening quarters and are replaced with the final grade at the completion of the sequence. In order to gain credit toward graduation, a student must successfully complete the entire sequence. For electing *P/NP* grading for a course graded in-progress, see *Passed/Not Passed (P/NP) Grading*, on page 91.

### Incomplete Grades

The grade of *I* may be assigned when a student's work is of passing quality and represents a significant portion of the requirements for a final grade, but is incomplete for a good cause as determined by the instructor; good cause may include current illness, serious personal problems, an accident, a recent death in the immediate family, a large and necessary increase in working hours or other situations of equal gravity.

In courses listed in the *General Catalog* as being letter graded, "passing quality" means "of *D-* quality or better." This standard holds in such courses whether or not the student has elected to take the course on a *Passed/Not Passed* or *Satisfactory/Unsatisfactory* basis. For courses listed in the *General Catalog* as being graded on a *Passed/Not Passed* or *Satisfactory/Unsatisfactory* basis only, the completed work must be of a quality consistent with a grade of *Pass* or *Satisfactory*, respectively.

You may replace an *I* grade with a passing grade and receive unit credit (and grade points if the instructor assigns a letter grade) provided you satisfactorily complete the course work as specified by the instructor. In order to change your records, you must obtain a petition from the Office of the University Registrar and present it to your instructor for completion and mailing.

An *I* grade must be replaced with a letter grade (or *P* or *S* grade) before the end of the third succeeding quarter (excluding summer sessions) of the student's academic residence, or the grade will revert to an *F* (or *NP* or *U*). If a student's degree is conferred before the expiration of the time limit for an *I*-grade conversion, the graduated student shall have until the end of the third quarter succeeding the quarter in which the *I* grade was assigned to replace the *I* grade. If the grade is not replaced by then, the *I* grade will remain on the student's record.

You may not re-enroll for credit in a course for which an *I* grade has been assigned. An undergraduate student whose record shows more than 16 units of *I* grades will be subject to disqualification. A graduate student who accumulates more than eight units of *I* grades will be subject to probation.

Incomplete grades will not be included in your grade point average at the end of a quarter. However, at the time of graduation, any remaining *I* grades are included when your grade point average is computed in order to determine whether you have achieved the 2.000 average required for the bachelor's degree. An Incomplete grade, in these computations, has the same effect as a grade *F*, *NP*.

or *U*, depending on which option you have exercised. Therefore, it is recommended that students not delay the clearance of incomplete grades so as not to jeopardize graduation.

If the degree has not been conferred, and the work has not been completed before the end of the term three calendar years after the grade Incomplete has been assigned, and during which the student has not been in academic residence as defined in Regulation 610, the grade Incomplete shall remain on the student's record, unless the course is repeated. This time-limit for the completion of courses assigned the grade Incomplete shall apply to all and only those courses in which the grade Incomplete is assigned on or after September 1, 2010 per Academic Senate Regulation A540(c).

### Retroactive Grade Changes

All grades except *I* and *IP* are final when filed by an instructor at the end of the quarter. No final grade except *I* may be revised by examination or the submission of additional work after the close of the quarter.

If a clerical or procedural error in the reporting of a grade by the instructor can be documented, you may request a change of grade with the instructor. Information regarding grade changes is available at <http://registrar.ucdavis.edu/records/grades/changes.cfm>. The request must be made by the fifth week of the following quarter.

Grade changes for "clerical" errors (such as incorrect addition of points), upon documentation, may be approved by the Office of the University Registrar without requiring review by the Academic Senate Committee on Grade Changes. Requests to interchange *P*, *NP*, *S* or *U* grades with normal letter grades based upon student need (such as to allow graduation or to meet entrance requirements for professional school) do not involve clerical or procedural errors and are automatically denied. Thus, students should exercise the Passed/Not Passed or Satisfactory/Unsatisfactory grading options with caution.

Students are reminded of their responsibility to be aware of the procedures and regulations contained in the *General Catalog*, to verify their class schedules, and to familiarize themselves with the expectations of their instructors. No changes, except completion of an *I* grade as noted above, can be made to the student's record once he or she has graduated.

### Repeating Courses

Undergraduate students may only repeat courses in which they received a *D*, *F* or *NP*. Courses in which students received a grade of *D* or *F* may not be repeated on a *P/NP* grading basis. (Courses in which a grade of *NP* was received may be repeated on a *P/NP* grading basis.)

Degree credit for a repeated course will be given only once, but the grades assigned for both the first and second time a course is taken will appear on the student's transcript. In computing the GPA of undergraduates who have received a grade of *D* or *F*, only the grade and corresponding grade points earned the second time a course is taken will be used, up to a maximum of 16 units for all repeated courses. After the 16-unit maximum is reached, the GPA shall be based on all grades assigned and total units attempted.

Repeating a course more than once requires approval by the appropriate college dean. Departments may restrict the repetition of a course if it is a prerequisite to a course the student has already completed with a grade of *C-* or better.

Graduate students, with the consent of the appropriate graduate adviser and the dean of Graduate Studies, may repeat any course in which they received a *C*, *D*, *F* or *U*, up to a maximum of three courses for all courses repeated. Courses in which a grade of *C*, *D* or *F* has been earned may not be repeated on an *S/U* basis. Courses in which a grade of *U* as received may be repeated on an *S/U* basis.

Degree credit for a repeated course will be given only once, but the grades assigned for both the first and second time a course is taken will appear on the student's transcript. In computing the GPA of graduate students who have received a grade of *C*, *D* or *F*, only the most recently earned grade for each course and corresponding grade points will be used, up to a maximum of three courses for all courses repeated. After the three courses maximum is reached, the GPA shall be based on all grades assigned and total units attempted.

### Mid-Term Grade Standing

Students wishing to know their grade at the mid-quarter should ask the instructor. Those who have deficient grades (*D*, *F* or *NP*) are urged to confer with their advisers.

### Final Grades

Grades are generally available about three weeks after a quarter has ended. You can check your grades through SISWeb or myucdavis Schedule Builder at <https://students.my.ucdavis.edu/>.

### Transcripts

A record of each student's academic work at UC Davis is retained permanently by the Office of the University Registrar. Copies of your official transcript may be obtained from the Office of the University Registrar. For more information on how to request a transcript and applicable transcript fees, see the Office of the University Registrar website at <http://registrar.ucdavis.edu/records/transcripts/>.

Transcripts of all work done through UC Davis Extension or concurrent enrollment must be requested directly from the UC Davis Extension Office, 1333 Research Park Drive, Davis, CA 95616. Transcripts of work completed at another campus of the university or at another institution must be requested directly from the campus or institution concerned.

### PROBATION AND DISMISSAL

The following provisions apply to all undergraduates. Graduate and professional students with scholarship deficiencies are subject to action at the discretion of their respective deans.

### Scholastic Deficiencies

A student will be placed on probation or subject to disqualification for failure to meet qualitative or quantitative standards of scholarship.

**Qualitative Standards.** The qualitative standards of scholarship require that a student maintain a *C* average (2.000) or better for all work undertaken in the university and for the work undertaken in any one quarter.

A student will be placed on probation for qualitative reasons if, at the end of any quarter, the student's grade point average (GPA) is:

- Less than 2.000, but not less than 1.500, for the quarter  
or
- Less than 2.000 for all courses taken within the University of California

A student will be **subject to disqualification for qualitative reasons** if, at the end of any quarter,

- The student's grade point average is less than 1.500 for the quarter,  
or
- The student's grade point average is less than 1.500 for all courses taken within the University of California,  
or
- The student has attempted more than 16 units graded I (Incomplete),  
or
- The student has spent two consecutive quarters on academic probation.

In the case of probation or subject to disqualification for qualitative reasons, the official transcript will state that the student is not in good academic standing. Once a student has met the qualitative standards of scholarship, or has satisfied all requirements for graduation, the notation will be removed from the transcript.

**Quantitative Standards.** The quantitative standards, referred to as minimum progress requirements, define scholarship in terms of the number of units that you must satisfactorily complete. It is expected that a student will earn the 180-unit minimum degree requirement within 12 quarters (four years). This means students are expected to complete, on average, 15 units per quarter.

Because occasions arise which prevent students from achieving expected progress towards the degree, the campus has established minimum progress requirements, to which students must adhere. To meet minimum progress, a full-time regular undergraduate is required to maintain an average of at least 13 units passed over all quarters of enrollment. Minimum progress is calculated at the end of every Spring Quarter for the preceding three quarters (Fall, Winter, Spring) comprising the academic year. Quarters during that period for which a student was officially approved for part-time status are omitted from the minimum progress calculation.

The following courses may be counted toward unit minimum progress:

- Required non-credit courses, e.g., Mathematics B, will be evaluated according to the "Carnegie unit" rule and counted as units passed, although these courses shall not be applied toward the satisfaction of baccalaureate degree requirements.
- Repeated courses passed to improve D or F grades up to a maximum of 16 units.
- Courses passed in Summer Sessions at UC Davis or at another accredited school and transferred to UC Davis will be counted as units passed (applied to the next full-time quarter of enrollment immediately following the summer session).

- Courses passed by examination in accordance with policies established by the Divisional Committee on Courses (applied to quarter in which exam is taken).
- Courses that are *IP* (in progress) will be counted as units passed.
- Courses graded *I* will be counted as units passed when replaced by a passing grade (applied to the quarter in which the *I* grade is received).

A student will be placed on **probation for quantitative reasons** if, at the end of any Spring Quarter, the minimum progress calculation for the preceding academic year shows that the student passed an average of less than 13 units but greater than or equal to 12 units per quarter.

A student will be **subject to disqualification for quantitative reasons** if, at the end of any Spring Quarter, the minimum progress calculation for the preceding academic year shows that the student passed an average of less than 12 units per quarter.

For every student who is subject to academic disqualification for quantitative reasons at the end of Spring Quarter, a "degree progress average" will be calculated at the close of the next full-time quarter of enrollment at UC Davis. The degree progress average is defined as the quotient of the number of units passed during all full-time quarters from the initial quarter of matriculation at UC Davis divided by the number of full-time quarters completed at UC Davis.

A student whose degree progress average is less than 13 units shall be "subject to disqualification for quantitative reasons." A student whose degree progress average is 13 or more units shall not be "subject to disqualification for quantitative reasons."

The degree progress average shall be calculated each subsequent full-time quarter of enrollment as long as the student is "subject to disqualification for quantitative reasons." A student who is "subject to disqualification for quantitative reasons" at the end of two consecutive full-time quarters of enrollment shall be disqualified from the university.

In the case of dismissal for quantitative reasons, the official transcript will state that the student is not in good academic standing." Once a student has met the quantitative standards of scholarship, or has satisfied all requirements for graduation, the notation will be removed from the transcript.

## Dismissal

Dismissal for either qualitative or quantitative reasons (defined above) is based on the decision of the dean of the college in which the student is enrolled. Such dismissal is from the University of California system and not simply the college or the UC Davis campus. Should a former UC Davis student later wish to be readmitted to the UC Davis campus, the authority to do so rests with the dean of the college from which the student was dismissed. If a student is dismissed from their college, they will automatically receive a full refund of registration fees paid for that term.

Students should go to the dean's office of their college or the Biology Academic Success Center if they need academic advising about probation and dismissal.

## HONORS AND PRIZES

### Deans' Honors Lists

According to UC Davis campus regulations, the quarterly Dean's Honors List includes names of students who have completed, for a letter grade, a minimum of 12 units in a specific quarter with a grade point average equal to or higher than the minimum grade point average attained by the upper 16 percent of those registered in the same class level and college during that quarter. Honors lists will be posted quarterly on deans' office websites or made available by other means and a notation of these honors will be placed on each student's permanent record by the Office of the University Registrar.

### Graduation Honors

Honors at graduation are awarded to students who have a grade point average in the top percent of their college as shown in the table below. The College of Letters and Science requires that additional criteria be met for high and highest honors; see the sections below for more information.

Total Quarter Units Completed at UC	Highest Honors	High Honors	Honors	Total
45-89	2%	next 2%	next 4%	8%
90-134	3%	next 3%	next 6%	12%
135+	4%	next 4%	next 8%	16%

Grade point averages from the winter quarter prior to graduation are used to determine the averages that will earn an honors designation. Following are the averages for winter quarter 2016. These averages will be used through winter quarter 2017.

Grade Point Average by College

Percent Determining Cut-Off Point	Agricultural & Environmental Sciences	Biological Sciences	Engineering	Letters and Sciences
2%	3.908	3.964	3.945	3.932
3%	3.861	3.950	3.897	3.900
4%	3.829	3.922	3.868	3.867
6%	3.782	3.864	3.807	3.804
8%	3.728	3.821	3.756	3.755
12%	3.637	3.742	3.679	3.670
16%	3.551	3.679	3.563	3.588

An honors notation is made on students' diplomas and on their permanent records in the Office of the University Registrar.

**College of Letters and Science.** Graduation with "honors" requires that a student meet the appropriate grade point requirement described in the above table for all UC courses completed. Students who meet the grade point requirement for graduation with honors, and who complete the Honors Program of the College of Letters and Science, may be recommended by their departments for graduation with high honors or highest honors on the basis of an evaluation of their academic achievements in the major and in the honors project in particular. Graduating students will not be awarded honors with the bachelor's degree if more than eight units of grade *I* (Incomplete) appear on their transcripts. The College Committee on Honors may consider exceptions to this condition. Petitions for this purpose should be submitted to the Undergraduate Education and Advising Office.

### The Honors Program of the College of Letters and Science

The Honors Program in the College of Letters and Science permits students to pursue a program of study in their major at a level significantly beyond that defined by the normal curriculum. It represents an opportunity for the qualified student to experience aspects of the major that are representative of advanced study in the field. Successful completion of the College Honors Program is a necessary prerequisite to consideration for the awarding of high or highest honors at graduation.

Entrance into the honors program requires that a student have completed at least 135 units with a minimum grade point average of 3.500 in courses counted toward the major. Other prerequisites for entrance into the program are defined by the major. The program consists of a project whose specific nature is determined by consultation with the student's major adviser. It may involve completion of a research project, a scholarly paper, a senior thesis, or some comparable assignment depending on the major. The project will have a minimum duration of two quarters and will be noted on the student's record by a variable unit course number or special honors course designation. Successful completion of the honors program requires that a minimum of six units of credit be earned in course work for the project.

### The Honors Program of the College of Engineering

An Honors Program is available to qualified students in the Chemical Engineering, Biochemical Engineering, and Materials Science and Engineering majors. The Chemical Engineering and Materials Science Honors Program is a four-year program designed to challenge the most talented students in these majors. Students invited to participate will take a one-unit honors seminar in their freshman year and will enroll in various one-unit honors courses. In the upper division, students will complete either an honors thesis or a project that might involve local industry (Chemical Engineering 194 HA, HB, HC). Students must maintain a grade point average of 3.500 to continue in the program. Successful completion of the Honors Program will be acknowledged on the student's transcript.

### University Honors Program

(formerly Davis Honors Challenge & Integrated Studies Honors Program)  
[honors@ucdavis.edu](mailto:honors@ucdavis.edu); <http://honors.ucdavis.edu>

The University Honors Program (UHP) is an interdisciplinary, campus-wide honors program for highly motivated students interested in enhancing their education through special courses, close contact with faculty, and dynamic interaction with academic peers. High-achieving students are invited in spring to apply for participation in the fall.

General Education Honors courses, seminars, and special study opportunities constitute the course offerings of the University Honors Program. A complete list of these courses, with course registration numbers, is made available to admitted students through the UHP office.

Approximately 185 students live in the Honors Academic Residential Community during their first year. Students ranked within the top 5% of the UC Davis entering class are invited to participate.

and are selected to create a balanced community of students from all four undergraduate colleges. For specific program details, see the University Honors Program website at <http://honors.ucdavis.edu>.

### Prizes and Awards

The University Medal is the highest campus honor awarded to a graduating senior in recognition of superior scholarship and achievement. A College or School Medal is also given to the outstanding graduating student in each of the colleges and professional schools.

Departmental citations, special awards and prizes are also awarded to students for superior achievement and scholarship.

**College of Agricultural and Environmental Sciences.** Each year, the outstanding graduating senior in the College is awarded a silver medal, known as the "Agricultural and Environmental Sciences Medal." Scholastic excellence (in a minimum of six quarters at UC Davis) is the primary basis for choosing the recipient. The Mary Regan Meyer Prize is awarded to an outstanding graduate who has demonstrated expertise and an interest in serving humanity. The Charles E. Hess Award is awarded to the graduate with the most noteworthy record of public/community service while at UC Davis. The Kinsella Memorial Prize, in honor of John E. Kinsella, is awarded annually to an outstanding individual who submits his or her Ph.D. dissertation during the spring, fall winter quarter or summer session immediately preceding the due date for nomination.

**College of Biological Sciences.** Each year, the College Medal is awarded to one outstanding graduating senior. Academic excellence and outstanding research are the primary bases for selecting medal nominees. The Undergraduate Student of the Year is awarded to a graduating senior based on academic excellence, research activity and involvement in service to the campus or community. For additional information regarding college awards, please contact the Dean's Office or the Biology Academic Success Center.

**College of Engineering.** Each year, outstanding senior students in engineering are selected by their grade point averages as nominees for the M.S. Ghausi Medal. Academic excellence is the primary basis for selecting the recipient of the award. Graduate students are eligible for the Zuhair Munir Award, given to the student who has submitted the year's best engineering doctoral dissertation. The award honors Zuhair Munir, former Dean of the College and its Associate Dean for Graduate Studies for twenty years.

**College of Letters and Science.** Graduating seniors with a distinguished academic record may be recommended by the faculty as nominees for the College's Herbert A. Young Medal. Each June, one medalist is selected from among the graduates of the current academic year. The Leon H. Mayhew Award is conferred upon the outstanding graduate majoring in the arts or humanities, preferably music, art, or literature. Academic excellence is the primary basis for selecting the recipients of these awards. The Lawrence J. Andrews prize is awarded to a student entering the senior year who not only has achieved academic excellence but who also has demonstrated interests outside of pure scholarship.

### Chancellor's Award for Excellence in Mentoring Undergraduate Research

These prestigious awards recognize a graduating senior who has distinguished him/herself through their excellence in undergraduate research; and faculty, postdocs or graduate students who have excelled in mentoring undergraduate researchers. The student winner, chosen for completing research or scholarship in any academic subject while at UC Davis, is announced and awarded a special plaque at commencement ceremonies in June. In conjunction with the Chancellor's Award, Professor Dean Simonton of UC Davis' Department of Psychology established an endowment for funding a cash prize for each year's student recipient. An award is also given each year to a faculty, graduate student or postdoctoral fellow mentors for their outstanding contribution to mentoring undergraduate researchers. For more information, see [http://urc.ucdavis.edu/awards/chancellors\\_award/index.html](http://urc.ucdavis.edu/awards/chancellors_award/index.html).

### Honorary Societies

Election to an honorary society is one of the most prestigious awards a student can receive. At UC Davis, the following honor societies are established as student organizations:

- Alpha Omega Alpha (Medicine)
- Alpha Zeta (College of Agricultural and Environmental Sciences)
- Chi Epsilon (Engineering)
- Golden Key (All colleges and schools)
- The National Society of Collegiate Scholars (All colleges and schools)
- Order of Omega (Fraternities-Sororities)
- Phi Alpha Theta (History)
- Phi Kappa Phi (All colleges and schools)
- Prytanean Honor Society (All colleges-undergraduate women only)
- Psi Chi (Psychology)
- Tau Beta Pi (Engineering)

### LEAVING UC DAVIS

#### Graduation

Each candidate for an undergraduate degree must file an **Application for Graduation** with the Office of the University Registrar for the quarter in which the candidate plans to receive the degree; see <http://registrar.ucdavis.edu/graduation>. The dates for campus filing are published in the **Academic Calendar**, on page 1, and at <http://registrar.ucdavis.edu/registration/leave/graduate/>.

Students in the College of Agricultural and Environmental Sciences must have their Major Certification evaluated by the dean's office before their candidacy for a degree can be finalized; see **Bachelor's Degree Requirements** for the college in the **Undergraduate Education** chapter.

Graduating students who wish to participate in the Commencement Ceremony must register to do so with their college by the filing deadline for that term at <http://commencement.ucdavis.edu>. Commencement Ceremonies are held twice a year, in the fall (December) and spring (June).

Please note that to graduate, undergraduate students *must* file an Application for Graduation with the Office of the University Registrar by the stated deadline. To participate in the Commencement Ceremony, a student *must* register with their college by the stated deadline. *These are separate actions.*

### **Leave of Absence: Planned Educational Leave Program (PELP)**

The Planned Educational Leave Program allows any registered student—undergraduate or graduate—to suspend academic work at UC Davis temporarily. Undergraduates may take one such leave during their academic career at UC Davis; that leave is limited to one quarter in duration. Undergraduates apply for PELP through the Office of the University Registrar at <http://registrar.ucdavis.edu/registration/leavelelp.cfm>. Graduate students apply through their departments and professional students apply through their dean's office.

Applications for PELP may be filed as late as the tenth day of instruction during the quarter for which the student is requesting a leave. However, approved applications submitted after the first day of instruction will entitle you to only a partial retraction of tuition and student fees assessed, which may provide a refund in accordance with the Schedule of Refunds. The Schedule of Refunds refers to calendar days beginning with the first day of instruction. The effective date for determining a refund of fees is the date the completed and approved PELP Form is returned to the Office of the University Registrar; see the *Fees, Expenses and Financial Aid* chapter.

An application fee is charged to your account when you enroll in the PELP program.

While students may receive academic credit at other institutions and transfer this credit to UC Davis (subject to rules concerning transfer credit), participants are reminded that the intent of the program is to “suspend academic work.” Therefore, students are urged to carefully evaluate the desirability of taking academic work while away from the campus during PELP. Students enrolled in PELP are not eligible to enroll in Open Campus (Concurrent) courses at the UC Davis campus or to otherwise earn academic credit at UC Davis during the PELP leave.

You will not be eligible to receive normal university services during the planned leave. Certain limited services, however, such as placement and student employment services, counseling, and faculty advising are available. Students on PELP may elect to voluntarily enroll in the Davis Health Insurance Plan (SHIP). Undergraduate students may elect to enroll for one additional quarter of coverage. Graduate students may elect to enroll for up to two quarters or one semester of coverage. Students on PELP may also purchase limited borrowing privileges from the library. International students should consult Services for International Students and Scholars to find out how the PELP will affect their status. Grants and other financial aids will be discontinued for the period of the leave, but effort will be made, where legally possible, to allow you to renegotiate loan payment schedules and to ensure the availability of financial aid upon your return.

### **Cancellation/Withdrawal**

To cancel your registration before the first day of instruction or to withdraw from the university on or after the first day of instruction but on or before the last day of instruction,

undergraduate and graduate students must complete an online Cancellation/Withdrawal Form accessed through the Office of the University Registrar at <http://registrar.ucdavis.edu/registration/leave/cancellation-withdrawal.cfm>. Professional students must see their Registrar or administrative office to cancel or withdrawal. If you do not submit a Cancellation/Withdrawal Form, you will be liable for fees according to the Schedule of Refunds; see the *Fees, Expenses and Financial Aid* chapter. The effective date for determining a refund of fees is the date the Cancellation/Withdrawal Form is submitted. No exceptions will be made to this policy. After filing your withdrawal form, you must complete an Exit Interview with Student Accounting; see Student Accounting at <http://studentaccounting.ucdavis.edu/>.

If you are receiving financial aid, you must report your change of status immediately, in person or by mail, to the Financial Aid Office. If you are receiving veteran's benefits, you must also report your withdrawal to the Veterans Affairs Office.

**College of Agricultural And Environmental Sciences** students planning to withdraw from the University are strongly advised to meet with an adviser in Undergraduate Advising Programs in 150 Mrak Hall or call 530-752-0108 to discuss readmission requirements prior to withdrawing.

**College of Engineering** students planning to withdraw from the University are strongly advised to meet with an adviser in the Engineering Undergraduate Office in 1050 Kemper Hall or call 530-752-1979 to discuss readmission requirements prior to withdrawing.

**College of Letters and Science** students planning to withdraw are strongly advised to meet with an adviser in the Undergraduate Education and Advising Office in 200 Social Science and Humanities Building or call 530-752-0392 to discuss readmission requirements prior to withdrawing.

**Retroactive Withdrawal.** Petitions for retroactive withdrawal may be obtained from the Office of the University Registrar. Petitions are subject to approval by the Academic Senate Committee on Grade Changes. Reasons for seeking such are medical problems, severe emotional difficulties, or death or severe illness in the immediate family. Petitions should include a detailed account of the problem, appropriate documentation and an adequate explanation of why withdrawal was not taken during the quarter in which the problem occurred.

### **RETURNING TO UC DAVIS; READMISSION**

If you are a former UC Davis undergraduate student who wishes to resume undergraduate studies, you may reapply through the Readmission process. You are considered a former student if you have interrupted the completion of consecutive terms of enrollment on the UC Davis campus. For details regarding the Readmission process, see <http://registrar.ucdavis.edu/registration/return/readmission.cfm>.

You may access the online Readmission application through the Office of the University Registrar at <http://registrar.ucdavis.edu/registration/return/readmission.cfm>. The online Readmission application must be submitted with the non-transferable, non-refundable application fee on or before the following deadlines:

- **Fall.** August 31.
- **Winter.** October 31.
- **Spring.** January 31.



UNDERGRADUATE EDUCATION

## UNDERGRADUATE EDUCATION

5th Floor, Mrak Hall  
530-752-6068

UC Davis offers the Bachelor of Arts (A.B.) and Bachelor of Science (B.S.) degrees in more than 100 major programs and many minors.

Undergraduate Education is governed by the Vice Provost and Dean for Undergraduate Education, and the Undergraduate Council, a standing committee of the Davis Division of the Academic Senate. The Vice Provost and Dean is also responsible for education-related programs including the Undergraduate Research Center, the Center for Leadership Learning, the University Honors Program, First Year Seminars, the Washington Program, Entry Level Writing, Summer Sessions, the Center for Educational Effectiveness, and International and Academic English.

Academic programs are offered by the four undergraduate colleges: the College of Agricultural and Environmental Sciences, the College of Biological Sciences, the College of Engineering, and the College of Letters and Science.

## COLLEGE OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES

Office of the Dean  
150 Mrak Hall  
530-752-0108; <http://www.caes.ucdavis.edu>

Major programs in the College of Agricultural and Environmental Sciences highlight the multiple connections among agricultural sciences, environmental sciences and human sciences within the larger context of the quality of life in the global economy. The majors fall into three broad areas of study described below. The College of Agricultural and Environmental Sciences also offers two college-wide degree programs and two college-wide non-degree programs.

### The Undergraduate Programs

#### **Agricultural Sciences**

These majors prepare students in animal biology and the management of environmental resources as needed to develop sustainable animal production technologies. Also considered is the impact of production and management processes on animal health and welfare, human diet and health, and the natural environment.

The majors that focus on plant science provide a strong background in the context of agricultural and environmental systems and societal needs; ecological understanding of food and fiber production systems; biological and economic principles that underlie management decisions in agribusiness; and a basic background in all areas of plant biology, including plant development, plant protection, biotechnology and post-harvest physiology.

#### **Majors:**

- Agricultural and Environmental Education, B.S.
- Animal Biology, B.S.
- Animal Science, B.S.
- Animal Science and Management, B.S.
- Biotechnology, B.S.
- Entomology, B.S.
- Plant Sciences, B.S.
- Sustainable Agriculture and Food Systems, B.S.

- Sustainable Environmental Design, B.S.
- Viticulture and Enology, B.S.

#### **Minors:**

- Agricultural Pest Management
- Agricultural Systems & Environment
- Applied Computing and Information Systems (Plant Sciences)
- Animal Biology (Animal Science)
- Animal Genetics (Animal Science)
- Aquaculture (Animal Science)
- Avian Sciences
- Dairy/Livestock (Animal Science)
- Environmental Horticulture (Plant Sciences)
- Equine (Animal Science)
- Forensic Entomology
- Fungal Biology and Ecology (Plant Pathology)
- Insect Biology (Entomology)
- Insect Ecology and Evolution
- Landscape Restoration
- Medical-Veterinary Entomology (Entomology)
- Nematology
- Precision Agriculture (Biological and Agricultural Engineering)

#### ***Environmental Sciences***

These majors focus on the broad facets of the human and natural environments and their interactions. They draw on the social, physical and biological sciences as needed to prepare students for leadership and advanced studies in the areas of natural resource management, environmental quality and stewardship, community planning and design, and public policy decision making.

#### **Majors:**

- Agricultural and Environmental Education, B.S.
- Atmospheric Science, B.S.
- Ecological Management and Restoration, B.S.
- Environmental Horticulture and Urban Forestry, B.S.
- Environmental Policy Analysis and Planning, B.S.
- Environmental Science and Management, B.S.
- Environmental Toxicology, B.S.
- Global Disease Biology, B.S.
- Hydrology, B.S.
- Landscape Architecture, B.S.
- Marine and Coastal Science, B.S.
- Sustainable Agriculture and Food Systems, B.S.
- Sustainable Environmental Design, B.S.
- Wildlife, Fish, and Conservation Biology, B.S.

#### **Minors:**

- Atmospheric Science (Land, Air, and Water Resources)
- Environmental Policy Analysis and Planning (Environmental Science and Policy)
- Environmental Toxicology
- Geographic Information Systems (Biological and Agricultural Engineering)
- Geographic Studies (Environmental Design)
- Global Disease Biology (Plant Pathology)
- Hydrology (Land, Air, and Water Resources)
- International Science Studies (Land, Air, and Water Resources)
- Landscape Restoration (Plant Sciences)
- Soil Science (Land, Air, and Water Resources)
- Watershed Science (Land, Air, and Water Resources)
- Wildlife, Fish, and Conservation Biology

## **Human Sciences**

These majors foster a deeper understanding of the multiple connections between scientific and cultural issues in the context of human health and the quality of life. Basic physical and biological science, social science, design, and economic principles are taught in this context, linking food and fiber production to consumption, emerging knowledge to societal applications and policy, and human development to active, informed citizenship. Emphasis is on linking resources for humans with humans as resources. Physiological, social and aesthetic dimensions of the human experience are explored.

### **Majors:**

- Agricultural and Environmental Education, B.S.
- Clinical Nutrition, B.S.
- Community and Regional Development, B.S.
- Fiber and Polymer Science, B.S.
- Food Science, B.S.
- Human Development, B.S.
- International Agricultural Development, B.S.
- Managerial Economics, B.S.
- Nutrition Science, B.S.
- Sustainable Agriculture and Food Systems, B.S.
- Sustainable Environmental Design, B.S.
- Textiles and Clothing, B.S.

### **Minors:**

- Aging and Adult Development (Human and Community Development)
- Community Development (Human and Community Development)
- Community Nutrition (Nutrition)
- Fiber and Polymer Science (Textiles and Clothing)
- Food Service Management (Nutrition)
- Human Development (Human and Community Development)
- International Agricultural Development (Plant Sciences)
- Managerial Economics (Agricultural and Resource Economics)
- Nutrition and Food (Nutrition)
- Nutrition Science (Nutrition)
- Textiles and Clothing

## **College-wide Programs**

The college-wide programs cut across all of the above areas, providing students in a variety of majors with a background in such areas as public policy, economic principles in a global context and the intersections among environmental, agricultural and socio-economic issues. College-wide programs also include non-degree, lower division curricula aimed at providing students with a foundational knowledge base and the potential for developing individualized programs.

### **Majors:**

- Individual Major, B.S. (suspended)

### **Minors:**

- Contemporary Leadership
- Science and Society

### **Non-degree programs:**

- Undeclared/Exploratory
- Science and Society

## **COLLEGE OF BIOLOGICAL SCIENCES**

Biology Academic Success Center  
1023 Sciences Laboratory Building  
530-752-0410; <http://basc.ucdavis.edu/>

The College of Biological Sciences administers undergraduate programs in fundamental aspects of biology. The college is organized into five departments that represent major themes of modern biology: Evolution and Ecology; Microbiology and Molecular Genetics; Molecular and Cellular Biology; Neurobiology, Physiology, and Behavior; and Plant Biology. A total of eight specialized majors are offered, each focusing on one of the core disciplines of biology. The Biological Sciences major, the Individual major, the Undeclared Life Sciences program and the Bodega Marine Laboratory Spring Quarter Program are offered by the entire college.

The academic advising for all majors within the college is administered through the Biology Academic Success Center (BASC). Students enrolled, or interested, in any of the college's majors may meet with an academic adviser at BASC to receive information on all major, college and university requirements, policies, and procedures, including PELP, withdrawal, readmission, change of major or college, multiple majors and late actions. Academic advisers work closely with master advisers, who are faculty members in the departments, to connect students to research opportunities in a variety of fields, and career development experiences in the community. Students are encouraged to meet with their academic advisers at least yearly, starting during their first two quarters of enrollment in the college.

## **The Undergraduate Programs**

### **Biological Sciences**

The Biological Sciences major is broad in concept, designed to span the numerous core disciplines of biology. The major covers most dimensions of the study of life, ranging from molecules and cells to populations of organisms.

#### **Major:**

- Biological Sciences, A.B., B.S.

#### **Minor:**

- Biological Sciences

### **Evolution and Ecology**

The major in Evolution, Ecology and Biodiversity offers the student a broad background in the theoretical and empirical basis of our understanding of the evolution and ecology of living organisms. The program of study begins with a core of introductory courses in mathematics, physical sciences and biology. These are followed by survey courses in evolution and ecology and more specialized courses that focus the student on particular disciplines or organisms, with an emphasis on problem-solving and critical thinking.

#### **Major:**

- Evolution, Ecology and Biodiversity, A.B., B.S.

#### **Minor:**

- Evolution, Ecology and Biodiversity

### ***Microbiology and Molecular Genetics***

Microbiology deals with bacteria, yeasts and other fungi, algae, protozoa and viruses. These microorganisms are ubiquitous in nature and play a crucial role in areas such as agriculture, biotechnology, ecology, medicine and veterinary science. The field of microbiology contributes to areas of fundamental inquiry such as biochemistry, cell biology, evolution, genetics, molecular biology, pathogenesis and physiology.

**Major:**

- Microbiology, A.B., B.S.

### ***Molecular and Cellular Biology***

The Department of Molecular and Cellular Biology offers three majors.

The Biochemistry and Molecular Biology major introduces students to the chemistry of living organisms and the experimental techniques that are used to probe the structures and functions of biologically important molecules. Students who enjoy both chemistry and biology and who are comfortable with quantitative approaches to problem-solving will find this major a rewarding field of study.

The Cell Biology major provides a comprehensive understanding of the cell, the basic structural and functional unit of all living organisms. The major emphasizes the principles that govern how biomolecules interact with one another to organize themselves into higher order structures that comprise cells and how cellular organization and function contribute to the development, maintenance and reproduction of adult organisms.

The Genetics and Genomics major provides a broad background in the biological, mathematical and physical sciences basic to the study of heredity and evolution. The major provides a dual focus on the molecular mechanisms that regulate utilization of information encoded within the genome as well as the mechanisms and analysis of inheritance of genetic information. The major is sufficiently flexible to accommodate students interested in the subject either as a basic discipline in the biological sciences or in terms of its applied aspects in medicine, biotechnology and agriculture.

**Majors:**

- Biochemistry and Molecular Biology, B.S.
- Cell Biology, B.S.
- Genetics and Genomics, B.S.

### ***Neurobiology, Physiology, and Behavior***

The Neurobiology, Physiology, and Behavior major emphasizes the understanding of vital functions common to all animals. All animals perform certain basic functions-they grow, reproduce, move, respond to stimuli and maintain homeostasis. The physiological mechanisms upon which these functions depend are precisely regulated and highly integrated. Actions of the nervous and endocrine systems determine behavior and the interaction between organisms and their physical and social environments. Students in this major will study functional mechanisms; the control, regulation and integration of these mechanisms; and the behavior which relates to those mechanisms at the level of the cell, the organ system and the organism.

**Majors:**

- Neurobiology, Physiology, and Behavior, B.S.

**Minors:**

- Exercise Biology
- Human Physiology
- Neuroscience

### ***Plant Biology***

Plant Biology is the study of plants as organisms. It includes the newer disciplines of cellular and molecular plant biology and the traditional areas of botany, such as anatomy, morphology, systematicatics, physiology, mycology, phycology, ecology and evolution. The major provides breadth in diverse areas of plant biology and depth in one of several areas of specialization.

**Major:**

- Plant Biology, A.B., B.S.

**Minor:**

- Plant Biology

### ***College-wide Programs***

#### ***Quantitative Biology and Bioinformatics***

The interdisciplinary minor in Quantitative Biology and Bioinformatics is an integrative program that introduces students to the quantitative and computational approaches that are redefining all disciplines in the biological sciences, from molecular and cell biology, through genetics and physiology, to ecology and evolutionary biology. The minor in Quantitative Biology and Bioinformatics is open to all undergraduates regardless of major and is sponsored by the College of Biological Sciences.

**Minor:**

- Quantitative Biology and Bioinformatics

#### ***Individual Major***

Students whose academic interests are not met by any established major, or combinations of majors and minors may develop an Individual major. Students work in conjunction with the Committee on Undergraduate Petitions and a faculty member in the college.

**Major:**

- Individual Major, A.B., B.S.

Students who wish to explore the array of life science majors offered at UC Davis before declaring a major may be admitted to the college through the Undeclared-Life Sciences program. These students use the Biology Academic Success Center for their advising center. Students in this program must declare a major before completing 90 units.

### ***Bodega Marine Laboratory Program***

<http://bml.ucdavis.edu/>

#### ***Spring Quarter Program***

A full quarter of undergraduate course work in marine biology is available each spring quarter at the Bodega Marine Laboratory, located in Bodega Bay, California. Course offerings include lecture

and laboratory instruction in the developmental biology and physiological adaptation of marine organisms, and population biology and ecology; a weekly colloquium; and an intensive individual research experience under the direction of laboratory faculty (Biological Sciences courses 120, 120P, 122, 122P, 123; Neurobiology, Physiology, and Behavior 141, 141P). This is a 15 unit program and course offerings and instructors may vary from year to year. Applications are due January 31. For more course detail, see [Bodega Marine Laboratory Program, on page 197](#) or <http://bml.ucdavis.edu/>.

### **Summer Sessions Courses**

This integrated program offers students a multidisciplinary understanding of coastal ecosystems through intensive, hands on courses taught at Bodega Marine Laboratory. The program offers courses during the Summer Session 1 and Summer Session 2 academic quarters with up to 10 units available in each quarter. Applications are due March 15. For more course detail, see full description under appropriate academic department listing or <http://bml.ucdavis.edu/>.

Course offerings and instructors may vary from year to year.

BML programs are residential with students housed on the laboratory grounds. Participants are assessed a room and board fee in addition to standard campus registration fees. Additional information is available directly from the Bodega Marine Laboratory at 707-875-2211, P.O. Box 247, Bodega Bay, CA 94923.

## **COLLEGE OF ENGINEERING**

Undergraduate Office  
1050 Kemper Hall  
530-752-1979; <http://engineering.ucdavis.edu>  
Facebook: <http://www.facebook.com/UCDEngineering>

Engineering is the profession in which the physical and biological sciences are applied in a practical way for the benefit of society. As an engineering student, you will learn to observe and describe technological problems and to seek useful solutions to them. Your skills upon graduation will be useful to you not only as an engineer, but also as a professional in management, sales, operations, manufacturing and other fields.

**Undergraduate Majors.** Eleven undergraduate majors are offered. Each of these is a four-year program leading to the degree of Bachelor of Science.

The following programs are accredited by the Engineering Accreditation Commission of ABET; see <http://www.abet.org>:

- Aerospace Science and Engineering
- Biochemical Engineering
- Biomedical Engineering
- Biological Systems Engineering
- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Electrical Engineering
- Materials Science and Engineering
- Mechanical Engineering

The Engineering Accreditation Commission and the Computing Accreditation Commission of ABET accredit the following program; see <http://www.abet.org>:

- Computer Science and Engineering

**Minor Programs.** The College of Engineering currently offers nine minor programs:

- Biomedical Engineering (Department of Biomedical Engineering)
- Construction Management and Engineering (Department of Civil and Environmental Engineering)
- Computational Biology (Department of Computer Science)
- Electrical Engineering (Department of Electrical and Computer Engineering)
- Energy Efficiency (Department of Biological and Agricultural Engineering)
- Energy Science and Technology (Department of Biological and Agricultural Engineering)
- Energy Policy (Department of Biological and Agricultural Engineering)
- Materials Science (Department of Chemical Engineering and Materials Science)
- Sustainability in the Built Environment (Department of Civil and Environmental Engineering)

In addition, the Department of Computer Science offers a minor in Computer Science.

## **The Undergraduate Programs**

### ***Biological and Agricultural Engineering***

Biological Systems Engineering majors learn to combine the science and art of engineering with the science of biology to design systems that influence, control, or use biological materials and organisms for improving the quality of life. Specific objectives include designing systems to process biological materials into consumer products; designing machines to interact with biological systems in disciplines ranging from agriculture to medicine; managing, recycling and using wastes; developing systems to protect and preserve our natural resources and environment; developing and improving processing systems for food; designing equipment and systems that improve nutrition and diets; and minimizing waste discharge to the environment.

**Major:**

- Biological Systems Engineering, B.S.

**Minors:**

- Energy Science and Technology
- Energy Policy
- Energy Efficiency

### ***Biomedical Engineering***

The Department of Biomedical Engineering advances fundamental medical concepts; creates knowledge from the molecular to the organ systems levels; and develops innovative biologics, materials, processes, implants, devices and informatics approaches. These approaches are applied to the prevention, diagnosis and treatment of disease. The objective is to prepare students for employment in companies that manufacture medical assist devices, human tissue products and therapeutics. The program also prepares students to enter a graduate program in biomedical engineering or pursue professional degrees in medicine and related health fields.

**Major:**

- Biomedical Engineering, B.S.

**Minor:**

- Biomedical Engineering

### ***Chemical Engineering***

The Department of Chemical Engineering and Materials Science offers three majors.

Chemical Engineering majors learn to apply chemical and engineering principles to create useful products ranging from antibiotics to zirconium, from petroleum to plutonium, from agricultural chemicals to plastics. Specific objectives include the design of industrial processes as diverse as integrated circuit materials production, integrated waste management and petroleum refining.

Biochemical Engineering majors combine chemical engineering studies with studies in the life sciences and bioprocess engineering. Bioprocess engineering is the application of engineering principles to develop, optimize and commercialize manufacturing processes. Specific objectives include pharmaceuticals production, environmental repair, industrial chemical production and food production.

***Majors:***

- Biochemical Engineering, B.S.
- Chemical Engineering, B.S.

### ***Civil and Environmental Engineering***

Civil Engineering majors learn to apply the principles of the physical and biological sciences and engineering to plan and design systems to improve the quality of life. Specific objectives include providing potable water and freedom from disease-carrying wastes; protecting the natural environment; mitigating the effects of earthquakes and other natural disasters; designing land-, water- and air-transportation systems; and building roads and structures.

***Major:***

- Civil Engineering, B.S.

***Minors:***

- Construction Engineering and Management
- Sustainability in the Built Environment

### ***Computer Science and Engineering***

The field of computer science and engineering encompasses the organization, design, analysis, theory, programming and application of digital computers and computing systems. The curriculum develops versatile engineers with backgrounds spanning a broad computer/software spectrum. The Computer Science and Engineering major provides a solid background in mathematics, physics, chemistry and electronic circuits and systems—all supporting the computer hardware and software courses that form the focus of the curriculum. A key theme is the hardware/software interaction in computer system design; this theme is reflected in the balance between hardware and software course requirements and in the orientation of the courses themselves.

***Major:***

- Computer Science and Engineering, B.S.

***Minor:***

- Computational Biology

### ***Electrical and Computer Engineering***

Electrical Engineering majors learn to apply the principles of the physical sciences and engineering to the design, analysis, development, production and evaluation of electronic systems. Specific objectives include the provision of systems for communications, control, signal processing, integrated circuit fabrication, optoelectronics, consumer electronics and digital systems.

Computer Engineering majors study the design, development, analysis, organization, theory, programming and application of digital computers. Specific objectives include developing the student's ability to design both software and hardware. In comparison to the Computer Science and Engineering major, the Computer Engineering major provides greater emphasis on hardware in the key hardware/software interaction in computer system design.

***Majors:***

- Computer Engineering, B.S.
- Electrical Engineering, B.S.

***Minor:***

- Electrical Engineering

### ***Materials Science and Engineering***

The Department of Materials Science and Engineering offers one major.

Materials Science and Engineering majors learn to understand the relationships among microscopic structure, properties and behavior of materials in order to produce new and improved materials with capabilities far superior to common metals, alloys and ceramics. Specific objectives include the development of materials for high-speed transportation systems, surgical and dental implants, new generations of power plants and solid-state electronic devices in computer and optical communications technology.

***Major:***

- Materials Science and Engineering, B.S.

***Minor:***

- Materials Science

### ***Mechanical and Aerospace Science Engineering***

Aerospace Science and Engineering majors learn to apply the principles of the physical sciences and engineering to vehicles whose motion is determined by aerodynamic forces. Specific objectives include the design, development and manufacture of aircraft and other transportation systems integrating the disciplines associated with aerodynamics, propulsion, structures and guidance/control.

Mechanical Engineering majors learn to apply physical and mechanical principles to the design and manufacture of machines and products, energy conversion systems and equipment for guidance and control. Specific objectives include the provision of products and processes for intelligent manufacturing systems, biomechanical and sports equipment, power generation systems, propulsion for transportation, integration of vehicles and automated highways, and applications of computer and automation technologies.

***Majors:***

- Aerospace Science and Engineering, B.S.
- Mechanical Engineering, B.S.

## COLLEGE OF LETTERS AND SCIENCE

Office of Undergraduate Education  
and Advising  
Room 200, Social Sciences  
and Humanities Building  
530-752-0392; <http://www.ls.ucdavis.edu/advising/>

Major programs in the College of Letters and Science provide students systematic exposure to the key principles, methods, findings and representations of a selected area of study. In pursuing a major, students gain intellectual depth and competency in that subject matter, explore important linkages with collateral fields of inquiry and are encouraged to engage in independent study.

The academic programs offered through the college are grouped in three divisions: Humanities, Arts and Cultural Studies; Mathematical and Physical Sciences; and Social Sciences. One college-wide degree program, the individual major, also is available.

### The Undergraduate Programs

#### ***Division of Humanities, Arts and Cultural Studies***

These majors focus centrally on the artifacts, expressions and concerns of humankind in various cultures and times. They provide students the opportunity to explore the creation, performance and analysis of works of art, the language and customs of non-English speaking societies, the theory and criticism of literature, and the peoples and cultures of this nation and its hemisphere. Students interested in studying these types of issues may select from more than 25 different majors.

##### **Majors:**

- African American and African Studies, A.B.
- American Studies, A.B.
- Art History, A.B.
- Art Studio, A.B.
- Asian American Studies, A.B.
- Chicana/Chicano Studies, A.B.
- Chinese, A.B.
- Cinema and Digital Media, A.B.
- Classical Civilization, A.B.
- Comparative Literature, A.B.
- Design, A.B.
- English, A.B.
- French, A.B.
- Gender, Sexuality and Women's Studies, A.B.
- German, A.B.
- Italian, A.B.
- Japanese, A.B.
- Medieval and Early Modern Studies, A.B.
- Music, A.B.
- Native American Studies, A.B.
- Religious Studies, A.B.
- Russian, A.B.
- Spanish, A.B.
- Theatre and Dance, A.B.
- Women's Studies, A.B.

##### **Minors:**

- African American and African Studies
- American Studies
- Art History
- Art Studio
- Asian American Studies

- Chicana/Chicano Studies
- Chinese
- Classical Civilization
- Comparative Literature
- Dramatic Art
- English
- Film Studies
- French
- Gender, Sexuality and Women's Studies
- German
- Global and International Studies
- Greek
- Human Rights
- Italian
- Japanese
- Latin
- Luso-Brazilian Studies
- Medieval and Early Modern Studies
- Music
- Native American Studies
- Professional Writing
- Religious Studies
- Russian
- Sexuality Studies
- Social and Ethnic Relations
- Spanish

#### ***Division of Mathematical and Physical Sciences***

These majors focus primarily on the description and interpretation of the structure, processes and events of the physical universe. They provide students the opportunity to explore in depth the structure, properties and reactions of substances; fundamental mathematical techniques and models and their application to the interpretation and explanation of phenomena; studies of matter and energy and their interconversions; the nature and development of computer languages; and earth and environmental processes. Students interested in studying these types of subjects may select from twelve different majors. The division strongly encourages undergraduates to enroll in undergraduate research projects with one-on-one instruction by faculty scholar/researchers.

##### **Majors:**

- Applied Mathematics, B.S.
- Applied Physics, B.S.
- Chemical Physics, B.S.
- Chemistry, A.B., B.S.
- Computer Science, B.S.
- Geology, A.B., B.S.
- Marine and Coastal Science, B.S.
- Mathematical and Scientific Computation, B.S.
- Mathematical Analytics and Operations Research, B.S.
- Mathematics, A.B., B.S.
- Natural Sciences, B.S.
- Pharmaceutical Chemistry, B.S.
- Physics, A.B., B.S.
- Statistics, A.B., B.S.

##### **Minors:**

- Chemistry
- Computer Science
- Environmental Geology
- Geology
- Geophysics

- Mathematics
- Oceanography
- Physics
- Statistics

### **Division of Social Sciences**

These majors focus largely on issues and problems that characterize social, cultural, political and economic life across human societies. They provide students the opportunity to explore the relationships between people and the groups and organizations of which they are a part, the antecedents of individual behavior, the development of political and economic systems, the social forces that have shaped the contemporary world and the foundations of language, thought, knowledge and perception. Students interested in studying these types of issues may select from 15 dozen different majors.

#### **Majors:**

- Anthropology, A.B., B.S.
- Cognitive Science, A.B., B.S.
- Communication, A.B.
- East Asian Studies, A.B.
- Economics, A.B.
- History, A.B.
- International Relations, A.B.
- Linguistics, A.B.
- Middle East/South Asia Studies, A.B.
- Philosophy, A.B.
- Political Science, A.B.
- Political Science–Public Service, A.B.
- Psychology, A.B., B.S.
- Science and Technology Studies, A.B.
- Sociology, A.B.
- Sociology–Organizational Studies, A.B.

#### **Minors:**

- Anthropology
- Arab Studies
- Coaching Principles and Methods
- Communication
- East Asian Studies
- Economics
- History
- History and Philosophy of Science

- India and South Asia Studies
- Iran and Persian Studies
- Jewish Studies
- Latin American and Hemispheric Studies
- Linguistics
- Linguistics for Language Teachers
- Middle East/South Asia Studies
- Philosophy
- Political Science
- Psychology
- Sociology
- War-Peace Studies

### **College-wide Program**

Students whose academic interests cannot be satisfactorily met through the completion of an established major have the opportunity to develop an individual major. Individual majors may reflect the most recent trends in scholarship and research and are typically interdisciplinary in nature. The major proposal is developed in close and active consultation with two faculty advisers from the academic disciplines most closely related to the subject matter of the individual major. Careful faculty guidance and review assure that individual majors are comparable in academic rigor and intellectual coherence to those regularly available through the departments and programs of the college.

#### **Major:**

Individual Major, A.B., B.S.

## **BACHELOR'S DEGREE REQUIREMENTS**

You must satisfy four groups of requirements before you can become eligible for candidacy for the bachelor's degree; see [Bachelor's Degree Requirements](#), below. The four groups are:

- University requirements, which apply to all colleges;
- General Education requirements, which apply to all colleges;
- College requirements; and
- Major requirements.

You are responsible for seeing that all of your degree requirements are fulfilled.

Detailed information on university requirements, the General Education requirement and college requirements can be found in this chapter.

<b>Bachelor's Degree Requirements</b>			
<b>University Requirements</b>			
All students must fulfill the following University of California requirements:			
Entry Level Writing Requirement			
American History and Institutions Requirement			
Unit Requirement			
Residence Requirement			
Scholarship Requirement			
<b>General Education Requirement</b>			
All students must fulfill the campus General Education Requirement; see <a href="#">General Education Requirement, on page 107.</a>			
<b>College Requirements</b>			
<b>College of Agricultural &amp; Environmental Sciences</b>	<b>College of Biological Sciences</b>	<b>College of Engineering</b>	<b>College of Letters and Science</b>
Unit	Unit	Unit	Unit
Residence	Scholarship	Residence	Residence
Scholarship	English Composition	Scholarship	Scholarship
English Composition	Foreign Language (only A.B. & B.A.S. degrees)	English Composition	English Composition
	Breadth (only A.B. & B.A.S. degrees)	Current Catalog Curriculum	Area (Breadth)
<b>Major Requirements</b>			
Course requirements for each major are listed in the <a href="#">Programs and Courses</a> section of this catalog.			

## UNIVERSITY REQUIREMENTS

All students must fulfill the following University of California requirements.

### Entry Level Writing Requirement

The university requires every undergraduate student to demonstrate college-level proficiency in English composition by satisfying the Entry Level Writing Requirement (ELWR). Satisfaction of the ELWR is a prerequisite to all other undergraduate courses in English.

Students can meet this requirement by scoring:

- 680 or better on the College Board SAT Reasoning Test, Writing section (last administration January 2016); or
- 3 or above on either Advanced Placement Examination in English; or
- 30 or better on the ACT, English Language Arts; or
- 30 or better on the ACT, Combined English/Writing (last administered June 2015); or
- 5 or above on an International Baccalaureate Higher Level English A: Literature exam (formerly known as Higher Level English A1 exam); or
- 6 or above on the International Baccalaureate Standard Level English A: Literature exam (formerly known as Standard Level English A1 exam); or
- 5 or above on an International Baccalaureate Higher Level English A: Language and Literature exam; or
- 6 or above on an International Baccalaureate Standard Level English A: Language and Literature exam.

Students can also meet the requirement by earning a grade of C or higher in an acceptable 3 semester-unit or 4 quarter-unit college-level course in English composition.

All incoming California students who have not met the Entry Level Writing Requirement by April 1 must take the UC Analytical Writing Placement Examination (AWPE). The exam is administered the morning of the second Saturday in May, at testing centers throughout the state. Out-of-state U.S. students and California freshmen admitted after mid-April will take another form of the Analytical Writing Placement Examination on campus at the beginning of Fall quarter. For the time and location, see <http://entrylevelwriting.ucdavis.edu/examination-schedule/analytical-writing-placement-examination>.

The AWPE may be taken only once. Students who have not satisfied the requirement in one of the ways described above and who were not held for ESL coursework in the University Writing Program (see below) *must enroll in Workload 57 during their first quarter of residence at the university, or as soon thereafter as space is available in the course.* Workload 57, offered by Sacramento City College on the UC Davis campus, counts as 4.5 units on the study list and toward minimum progress but carries no units toward graduation. To satisfy the requirement, students must earn a course grade of C or higher; students who receive a grade lower than C must repeat Workload 57. Students who do not satisfy the Entry Level Writing Requirement by the end of the third quarter will be disenrolled from the University.

New students whose native or school language is not English (including some California residents who previously took the AWPE), and some students whose schooling combines work in the United States and in another country, will take the English Language Placement Exam (ELPE) to determine which UWP ESL course(s), if any, are needed prior to enrollment in Workload 57 and fulfillment of the Entry Level Writing Requirement. The English Language Placement Exam, which may be taken only

once, will be delivered via SmartSite and taken remotely during one of several testing periods during the summer before the first quarter. Students whose ELPE results require them to take one or more UWP ESL courses will have the standard three quarters to meet the Entry Level Writing Requirement *plus* the number of quarters they are held for UWP ESL coursework. The ELWR time line begins with the first quarter of enrollment at UC Davis and continues each quarter. Students who do not satisfy the ELWR within the time limit will be disenrolled from the University.

## American History and Institutions

The American History and Institutions requirement ensures that every graduating student will have at least a minimum knowledge of the background of this country's development and an understanding of the political, economic and social interrelationships of its way of life.

You may meet this requirement in any of these ways:

- Complete one high school unit in American history, or 1/2 high school unit in American history and 1/2 high school unit in civics or American government, with a grade of C or better in each course
- Complete any one of the following courses:
  - African American and African Studies 10, 100
  - Asian American Studies 1, 2
  - Chicana/Chicano Studies 10
  - Economics 111A, 111B
  - History 17A, 17B, 72A, 72B, 170A, 170B, 170C, 171A, 171B, 174A, 174B, 174C, 176A, 176B, 177A, 177B, 179, 180A, 180B, 183A, 183B (upper division courses may be taken only with the consent of the instructor)
  - Native American Studies 1, 10, 116, 130A, 130B, 130C
  - Political Science 1, 5, 100, 102, 104, 105, 106, 108, 109, 113, 130, 131, 160, 163

Students electing to complete one of the above courses in order to meet this requirement are subject to the rules for prerequisites and majors

- Present evidence that the requirement has been accepted as satisfied at another campus of the university
- Present evidence that the requirement has been satisfied through courses in the area of American History and Institutions at another collegiate institution whose credits are acceptable for transfer to UC Davis
- Successful completion of the Advanced Placement (AP) Examination in American History or American Government and Politics with a score of 3 or higher
- Successful completion of the International Baccalaureate (IB) Examination in History of the Americas Higher Level (HL) with a score of 5, 6, or 7
- Successful completion of the SAT Subject Examination in U.S. History with a score of 550 or higher

International students, regardless of the type of visa they hold, must meet the university's American History and Institutions requirement for graduation.

## Unit Requirements

A minimum of 180 quarter units is required for graduation. These must be distributed according to the minimum requirements set forth by the faculty of your college.

A maximum of 15 units of Internship Courses (92, 192, or a combination) may be counted toward the 180-unit bachelor's degree requirement.

The acceptability of transfer courses for unit credit is determined by Undergraduate Admissions. The acceptability of such courses toward specific requirements is determined by the individual college or school.

Students should refer to the Advanced Placement Examination chart and their transcripts to eliminate the possibility of duplication of credit.

## Residence Requirements

The minimum residence requirement for a bachelor's degree at the University of California is one academic year (three quarters). Thirty-five of the final 45 quarter units completed by each candidate must be earned while in residence on the UC Davis campus. Each summer session in which a student completes a course of at least 2 quarter units may be counted as half a quarter's residence.

Regularly approved courses (laboratory, field, or other individual work) done outside of a regular session but under the direction of a department of instruction may be accepted upon the recommendation of the department in partial fulfillment of the residence requirement for the bachelor's degree. Registration is with the consent of the instructor only.

UC Davis Extension courses are not accepted as part of the university residence requirement.

There are additional residence requirements for students enrolled in the Colleges of Letters and Science and Engineering. If you are planning to study abroad during your senior year, you should consult your college dean's office or the Biology Academic Success Center.

With the approval of the dean of a student's college or school, a candidate for the bachelor's degree who was in active service in the armed forces of the United States in the year preceding the awarding of the degree may be recommended for the degree after only one quarter of university residence in which the candidate completes at least 16 units or passes a comprehensive examination in the major or field of concentration.

## Scholarship Requirement

To receive a bachelor's degree, you must obtain twice as many grade points as units (a 2.000 GPA) for all courses you have attempted in the university. For specific college requirements consult the college sections following.

## GENERAL EDUCATION REQUIREMENT

The General Education (GE) requirement promotes the intellectual growth of all undergraduates by ensuring that they acquire a breadth of knowledge that will enlarge their perspectives beyond the focus of a major and serve them well as participants in a knowledge-based society. It seeks to stimulate continued growth by providing knowledge of both the content and the methodolo-

gies of different academic disciplines. It involves students in the learning process by its expectation of considerable writing and class participation, and encourages students to consider the relationships between disciplines.

## **General Education (GE) Requirement—Fall 2011 and On**

The following section pertains to students who matriculated to UC Davis for the first time in Fall 2011 or later. Students who matriculated prior to Fall 2011 should refer to the [Former General Education \(GE\) Requirement—Pre-Fall 2011, on page 109](#).

The GE requirement has two components, **Topical Breadth** and **Core Literacies**, and is defined in terms of units, not courses.

### **Topical Breadth Component . . . . . 52 units**

A GE course in topical breadth addresses broad subject areas that are important to the student's general knowledge. The units of most undergraduate courses at UC Davis are assigned to one of the three Topical Breadth Areas.

**Note:** In the case of a course that has been certified in more than one Topical Breadth Area, a student may count the units of the course in only one of the areas in which it has been certified.

- **Arts and Humanities . . . . . 12-20 units**  
Courses in this area provide students with knowledge of significant intellectual traditions, cultural achievements and historical processes.
- **Science and Engineering . . . . . 12-20 units**  
Courses in this area provide students with knowledge of major scientific ideas and applications. They seek to communicate the scope, power, limitations and appeal of science.
- **Social Sciences . . . . . 12-20 units**  
Courses in this area provide students with knowledge of the individual, social, political and economic activities of people.

### **Core Literacies Component . . . . . 35 units**

The literacies are crucial both for success in one's profession and also for a thoughtful engaged citizenship in the community, nation and world.

**Note:** In the case of a course that has been certified in more than one Core Literacy Area, a student may count the units of the course in only one of the core literacy areas in which it has been certified. Additionally, GE credit for a core literacy course a student completes before it was an approved GE literacy course is subject to the relevant dean's office or the Biology Academic Success Center approval.

#### **1. Literacy with Words and Images . . . . . at least 20 units**

The objective of this core literacy is to help students communicate their ideas effectively in written, oral and visual forms. The requirement also seeks to enhance students' critical judgment of oral, written, and visual messages created by others.

**Note:** A student must have completed the Entry Level Writing Requirement (formerly known as the Subject A requirement) before receiving General Education credit for coursework satisfying requirements a, b, and Writing Experience coursework satisfying requirement c, below.

**a. English Composition . . . . . 8 units**  
(as described by College of A&ES, College of L&S, College of Biological Sciences, or College of Engineering)

**b. Writing Experience** coursework in the student's major or in other departments . . . . . at least 6 units

Courses in writing experience provide students instruction on how to communicate ideas in the subject matter of the course. The opportunity to improve writing after having received careful commentary is crucial to this requirement.

**c. Oral Skills** coursework or additional writing experience coursework . . . . . at least 3 units

Courses in oral literacy involve effective communication of ideas through oral presentation and build on and strengthen the critical thinking skills exercised through writing. As an alternative to developing oral communication skills, the student may take additional coursework certified as writing experience (see requirement b, above).

**d. Visual Literacy** coursework . . . . . at least 3 units

Courses in visual literacy provide students with the analytical skills they need to understand how still and moving images, art and architecture, illustrations accompanying written text, graphs and charts, and other visual embodiments of ideas inform and persuade people. Coursework may stress the skills needed to communicate through visual means as well as the analytical skills needed to be a thoughtful consumer of visual messages.

#### **2. Civic and Cultural Literacy . . . . . at least 9 units**

The objective of this core literacy is to prepare students for thoughtful, active participation in civic society. Students will learn to think analytically about American institutions and social relations, understand the diversity of American cultures, and see the relationships between national and local cultures and the world.

**a. American Cultures, Governance, and History . . . . . at least 6 units;**  
of which at least 3 units must be in coursework certified as focusing on issues of domestic diversity.

Courses in American Cultures, Governance, and History provide students with an understanding and appreciation of the social and cultural diversity of the United States and of the relationships between these diverse cultures and larger patterns of national history and institutions.

**b. World Cultures . . . . . at least 3 units**

Courses in World Cultures provide students with a global perspective in a world where communication technologies, economic relationships, and the flow of people across national borders increasingly challenge national identities and create transnational cultures. Students can satisfy this requirement through coursework or through certified study abroad.

#### **3. Quantitative Literacy . . . . . at least 3 units**

The objective of this core literacy is to provide students with an understanding of quantitative reasoning and skills for eval-

uating claims and knowledge generated through quantitative methods.

#### 4. Scientific Literacy . . . . . at least 3 units

The objective of this core literacy is to provide students with an understanding of the fundamental ways scientists approach problems and generate new knowledge, and an understanding of how scientific findings relate to other disciplines and to public policy.

#### **Additional Conditions**

**Meeting Total Units Requirement.** With the exception of units used to satisfy the English Composition element, units approved for a Core Literacy will be accepted toward satisfaction of the appropriate Topical Breadth component. Course units that satisfy requirements in the candidate's major or majors may also be counted toward satisfaction of General Education requirements.

**Grading.** Students may take courses P/NP to fulfill their General Education requirements, up to the limits set by college and campus regulations.

**Advanced Placement and International Baccalaureate.** Students may not present Advanced Placement or International Baccalaureate credit in satisfaction of GE requirements, except insofar as it may be applied to the English Composition component of the Literacy with Words and Images requirement.

**Transfer Students** who have successfully completed the Intersegmental General Education Transfer Curriculum (IGETC) lower division course work are exempt from all General Education requirements that may be met with lower-division courses. Transfer students who have not completed the IGETC, and who are not entitled to graduate under the provisions of a *General Catalog* issued prior to Fall 2011 as permitted by the applicable college policy on degree requirement changes, are required to satisfy all General Education components under the revised requirement but may offer previously completed coursework toward their satisfaction.

#### **Approved Revised General Education Courses**

See New General Education Courses; Fall 2011 and On, on page 592, for a list of the courses that provide General Education credit. Please note that you cannot claim GE credit for a course you completed before it was an approved GE course.

#### **Former General Education (GE) Requirement—Pre-Fall 2011**

The following section pertains to students who matriculated to UC Davis prior to Fall 2011. Students who matriculated for the first time in Fall 2011 or later should refer to the [General Education \(GE\) Requirement—Fall 2011 and On, on page 108](#).

The GE requirement has three components: Topical Breadth, Social-Cultural Diversity and Writing Experience.

#### **Topical Breadth Component . . . . . 6 courses**

Topical breadth courses are grouped into three broad subject areas of knowledge:

**1. Arts and Humanities.** Courses in this area provide students with knowledge of significant intellectual traditions, cultural achievements and historical processes.

**2. Science and Engineering.** Courses in this area provide students with knowledge of major scientific ideas and applications. They seek to communicate the scope, power, limitations and appeal of science.

**3. Social Sciences.** Courses in this area provide students with knowledge of the individual, social, political and economic activities of people.

To fulfill the topical breadth component of the General Education requirement you must successfully complete three approved courses in each of the two subject areas of topical breadth other than the one that includes your major. To identify the area of topical breadth to which your major belongs, see [Topical Breadth Assigned Subject Areas for Majors and Minors; Pre-Fall 2011, on page 631](#). Each academic major has been assigned to one of the three subject areas of GE topical breadth. If you have any questions concerning the subject area to which your major is assigned, consult the relevant dean's office or the Biology Academic Success Center.

A course approved in more than one topical breadth subject area may only be offered in satisfaction of only one of those subject areas.

- **Double majors** will satisfy the topical breadth subject areas to which they are assigned. You will still be responsible for completing any topical breadth subject area in which you do not have a major. If, for example, two majors are assigned to the same subject area, you will need to complete the topical breadth component in each of the other two other subject areas. If, on the other hand, you complete two majors that have been assigned to two different areas of topical breadth then you will be responsible for completing the topical breadth component in only the remaining subject area.
- **Individual majors** are assigned to an area of topical breadth at the time they are approved by your college.
- **Each minor** has also been assigned to one of the three subject areas of topical breadth. A minor assigned to a subject area other than the area of your major will satisfy the GE course requirement for topical breadth in that subject area.
- **Courses in your major** may count toward the topical breadth component when those courses are also assigned to subject areas other than the area of your major.

#### **Social-Cultural Diversity . . . . . 1 course**

Courses in social-cultural diversity teach students the significance of the many patterned differences that characterize human populations—particularly differences of gender, race, ethnicity, sexuality, religion or social class.

To fulfill the social-cultural diversity component of the GE requirement, you must successfully complete one course from the approved list; see [Former General Education Courses; Pre-Fall 2011, on page 616](#).

#### **Writing Experience . . . . . 3 courses**

Courses in writing experience improve student writing through instruction and practice. Writing assignments are designed to encourage students to think critically and communicate effectively. Courses require one extended writing assignment (five

pages or more) or multiple short assignments. Writing is evaluated not only for content, but also for organization, style, use of language, and logical coherence.

To fulfill the writing experience component of the GE requirement, you must successfully complete three courses from the approved list at the back of this catalog.

**Note:** You must satisfy the university Entry Level Writing Requirement (formerly Subject A) before you take any writing experience course for GE credit. If you take an approved writing experience course, but have not yet satisfied the Entry Level Writing Requirement, you will not receive GE writing experience credit for that course.

### **Additional Conditions**

**Letter Grading.** All courses taken to fulfill the GE requirement must be taken for a letter grade. No GE credit will be awarded for a course that you take on a Passed/Not Passed basis.

**College and University Composition Requirements.** The following GE courses may not be used to satisfy university or college requirements in composition and GE writing experience simultaneously:

- Communication 1
- Comparative Literature 1, 2, 3, 4
- English 3
- Native American Studies 5
- University Writing Program 1, 18, 19, 101, 102 series, and 104 series

**Courses Approved for Multiple GE Components.** Courses approved for more than one component of the GE requirement (topical breadth, writing experience and social-cultural diversity) will be accepted toward satisfaction of all components for which the course has been approved.

**College of Engineering.** Beginning in Fall 2011, the General Education requirement changed. The new General Education requirement applies to freshmen admitted Fall 2011 or later. However, students admitted before Fall 2011 may follow the previous General Education requirement. To ensure accurate information about satisfying General Education, all students should schedule an appointment with their Engineering Departmental Adviser or speak with an adviser in the Undergraduate Advising office in 1050 Kemper Hall.

**Transfer Student Exemption for IGETC, TCC and UC Reciprocity.** You are exempt from the UC Davis GE requirement if you come from a California community college and are certified as having successfully completed the "Intersegmental General Education Transfer Curriculum" (IGETC) or "Transfer Core Curriculum" (TCC), or if you come from another UC campus and are certified as having successfully completed the lower division breadth or General Education requirements of that UC campus (UC reciprocity).

If you are a Transfer student who has not completed TCC or IGETC prior to attending UC Davis, transfer work comparable to approved UC Davis GE courses may be used to satisfy the GE requirement, as determined by the college's dean's office or the Biology Academic Success Center.

### **Approved Former General Education Courses**

See [Former General Education Courses; Pre-Fall 2011, on page 616](#), for a list of the courses that provide General Education credit. Please note that you cannot claim GE credit for a course you completed before it was an approved GE course.

### **General Education Theme Options**

The following section pertains to students who matriculated to UC Davis prior to Fall 2011.

General Education theme options are sets of GE courses sharing a common intellectual theme. Faculty from the College of Agricultural and Environmental Sciences has worked collaboratively to develop sets of complementary courses in several areas of interest. These GE theme options are not a separate element of the GE requirement, but a way of selecting your GE courses so that you may benefit from a coherent focus of study while completing the GE requirement.

Completion of a theme satisfies the GE requirement for students with majors assigned to the GE topical breadth area of Arts and Humanities. Students with majors assigned to the topical breadth area of either Science and Engineering or Social Science will need to complete additional GE courses in Arts and Humanities to satisfy the campus GE requirement.

Beginning a theme option does not prevent you from later choosing to take other approved GE courses to fulfill the GE requirement. If you choose to mix courses from a theme option and the broader GE course lists, you will need to make sure that the combination of courses you select will complete the campus GE requirement.

## **COLLEGE REQUIREMENTS FOR THE BACHELOR'S DEGREE**

### **College of Agricultural and Environmental Sciences**

#### **Unit Requirements**

Of the required 180 units counted toward a degree, 54 units must be upper division work.

#### **Unit Credit Limitations**

In addition, the following unit limitations apply to all majors:

- Not more than 6 units can be Physical Education 1 and 6
- Not more than 20 units can be courses numbered 90X, 92, 97T, 97TC, 99, 190C, 190X, 192, 197T, 197TC, or 199
- Not more than 12 units can be courses numbered 92 and/or 192 (credit will not be given for 192s or 199s taken before the completion of 84 units)
- Not more than 5 units per quarter of Special Study courses (99, 194H, 199)
- Not more than 9 units of professional courses (numbers 300–499) may be used toward the 54 upper division units

**Limitation on Credit for Units Graded P.** The Academic Senate limits the total number of courses graded *P*, including units earned in courses graded “P/NP only,” to one third of the units completed on the UC Davis campus. The *P/NP* option is to be used only for elective courses and should not be used for major requirements.

**Credit for Open Campus (Concurrent) Courses.** Students may apply credit for courses taken in the Open Campus (Concurrent) Program through UC Davis Extension towards the 180-unit undergraduate degree requirement. The grade points earned when enrolled in Open Campus courses will count toward the calculation of a student's UC GPA upon his/her admission or readmission to regular student status at UC Davis. Students registered at UC Davis may not enroll in Open Campus courses.

**Credit for UC Davis Extension Courses.** Registered UC Davis students who plan to use academic credit earned in a UC Davis Extension course other than Open Campus (Concurrent) towards their UC Davis degree must obtain prior written approval from their College before registering in the UC Davis Extension. Upon approval students may apply a limited number of credits towards the 180-unit undergraduate degree requirements. Courses completed in UC Davis Extension will not count toward the calculation of a student's UC GPA.

**Registration Beyond the 225-Unit Limit.** Students may not exceed 225 units; registration for enrollment when the limit has been reached may only be approved by the Dean. A petition to complete excess units may be picked up in the Dean's office or in your major department.

### **Residence Requirement**

Meet university residence requirement. No additional college residence requirements.

### **Scholarship Requirement**

Students in the College are required to attain a minimum grade point average of 2.000 for all courses specified as depth subject matter in their major. Options, specializations and emphases may be included. Consult your master adviser. Only grades earned in courses taken at UC Davis are included in the grade point calculation. Each candidate must complete a program of study either as prescribed in (a) a major approved by the Undergraduate Majors and Courses Standing committee and printed in this catalog, or (b) an individual major approved by the Individual Major Standing committee.

### **English Composition Requirement**

Once the Entry-Level Writing requirement has been satisfied, you may begin taking courses to meet the College's English composition requirement.

The English Composition requirement may be met in one of three ways:

**1.** Either two courses emphasizing written expression or one course emphasizing written expression and one course emphasizing oral expression, with a grade of *C-* (or *P*) or better. The following UC Davis courses satisfy this requirement:

(a) one course must be selected from English 3, University Writing Program 1, 18, 19, 101, 102 series, 104 series or Nematology 150 (courses with primary emphasis in writing skills);

(b) one course selected from the courses not selected above, or from Communication 1, Comparative Literature 1, 2, 3, 4, or Native American Studies 5 (courses emphasizing either writing or speaking skills);

**2.** Advanced Placement English score of 4 or 5 PLUS any course listed in 1(a) or 1(b) above EXCEPT University Writing Program 1 or English 3

### **OR**

**3.** By passing the English Composition Examination administered by the College of Letters and Science upon completion of 70 units of degree credit (the examination does not yield credit).

**English Composition Examination.** The no-fee, no-unit examination is typically offered on a Saturday in October, January and April; for specific dates, see <http://writing.ucdavis.edu/compexam/>.

If students choose to take this challenge exam, they are strongly advised to do so in their junior year. Register for the English Composition Examination at <http://writing.ucdavis.edu/compexam/> from the Monday before the exam date until Friday at noon or until no spaces remain. The AWPE/Upper-Division Composition Examination form, available at the UC Davis Bookstore, is required. It is recommended that students with disabilities contact the Student Disability Center at 530-752-3184 and the University Writing Program at 530-752-0450 at least two weeks prior to the exam date to arrange accommodations. No examinations are given during the summer.

### **General Education**

You should consult your Dean's Office or department adviser in advance to determine exactly how your General Education courses will apply toward your major.

You can choose one of four General Education theme options to help plan your GE courses. The themes, Global Population and Environmental Issues; Biodiversity and Cultural Diversity; Food and Fiber; and Changing Agriculture are described in more detail in [General Education Theme Options, on page 632](#).

### **Study Plan Approval**

A Study Plan provides for attainment of specific long-term goals and should allow for the acquisition of prerequisite knowledge for courses to be taken in subsequent quarters; the fulfillment of College and major requirements; a proper balance between the demands of the courses and your ability to master the subject matter; and meeting the minimum progress requirements; see [Course Load, on page 85](#).

In conjunction with a faculty adviser and/or staff adviser, you must plan and prepare a program that specifies your goals and shows how the graduation requirements will be met. It is a regulation that a written “study plan” be filed with your faculty adviser or staff adviser by the end of the second quarter of the junior year (having completed not more than 120 units either in residence and/or by transfer).

You may be denied registration for future quarters if you do not comply with this regulation. However, filing this study plan does not preclude a change of major or program modifications.

## **Major Degree Certification**

A Major Certification is completed during the quarter you plan to graduate. At that time, you and your faculty adviser and/or staff adviser check to see that all **major requirements have been completed**. The Dean's Office completes the degree certification by verifying that all **college and university requirements have been satisfied**.

## **Degree Requirement Changes**

On occasion, the faculty make changes in the requirements that students must satisfy to obtain the baccalaureate degree. So that you will not be penalized by changes that may work to your disadvantage and so that you will benefit by changes that assist you in completing your degree requirements, it is college policy that you may choose to fulfill the university, college and major requirements in effect at the time you were registered at UC Davis. If you have transferred to UC Davis from a community college, state college, or another university, you may follow the requirements as stated in any UC Davis *General Catalog* in effect *either during the three years immediately preceding your transfer to UC Davis or at the time you first registered at that institution, whichever is most recent*. Once you have chosen the year of the *General Catalog* under which you wish to be governed, you must satisfy all of the university, college and major requirements specified in that catalog.

## **College of Biological Sciences**

All students in the College of Biological Sciences must satisfy the following college requirements in addition to satisfying the [University Requirements, on page 106](#) and [General Education Requirement, on page 107](#).

### **Unit Requirements**

**Total Units.** Complete no less than 180 units allowing for the unit credit limitations listed below. No student may exceed 225 units in their academic career without approval of the Dean. Units earned in Advanced Placement and International Baccalaureate exams are not counted toward this 225-unit limit. Upon reaching 200 units, a student must submit a quarter-by-quarter graduation plan to the Biology Academic Success Center or a hold will be placed on his/her registration.

**Upper Division Units.** Complete 64 upper division units.

### **Unit Credit Limitations**

- **Passed/Not Passed Units.** All courses used to satisfy major requirements must be taken on a letter-graded basis, unless courses are only offered on a Passed/Not Passed basis.

The Academic Senate limits the total number of courses graded P, including units earned in courses graded "P/NP only," to one third of the units completed on the UC Davis campus.

- **Physical Education.** Maximum of 6 units of Physical Education 1, 6 and similar physical activity courses including transfer work.
- **Transfer work.** Maximum of 105 units of credit earned at two-year institutions (community college).
- **Graduate Courses.** Units from courses in the 200 series (with

the exception of course 299) may apply toward the minimum 64-unit upper division requirement and/or as a substitution for undergraduate courses in the major under the following conditions:

- Students must obtain written permission from the course instructor and the master adviser for their major.
- The master adviser will confirm that students have a minimum 3.400 GPA in the major at the time that they register for the course.
- **Professional and teaching courses.** Maximum of 9 units in courses numbered 300-399 and 400-499. These units may not be applied toward the 64-unit upper division requirement.
- **Upper division standing.** Must complete 84 units before enrolling in 192, 194H and 199 to receive degree and upper division credit.
- **Special Study.** Not more than 5 units per quarter of Special Study courses (99, 194H, 199).
- **Nonstandard Courses.** Maximum of 20 units of nonstandard courses including transfer work.\*

Nonstandard courses are defined here as tutoring, internship, research, research conference, honors research and similar course activities. Some examples of these courses are, but are not limited to, courses numbered 90C, 92, 92C, 97T, 97TC, 99, 189, 190C, 191, 192, 192C, 193, 194H, 197T, 197TC, 199, etc. Courses numbered 98 or 198 are not included in this 20-unit limitation.

There are additional unit credit limitations on tutoring and internship units.

- **Tutoring.** Maximum of 3 tutoring units including but not limited to 97T, 197T, 97TC and 197TC.
- **Internship.** A maximum of 6 internship units including but not limited to 92, 192, 92C, 192C.

\* Specific exceptions to these limits may be granted by the Committee on Undergraduate Petitions based on the uniqueness of the experiences and their concordance with the petitioner's educational objectives.

**Credit for Open Campus (Concurrent) Courses.** Students may apply credit for courses taken in the Open Campus (Concurrent) Program through UC Davis Extension towards the 180-unit undergraduate degree requirement. The grade points earned when enrolled in Open Campus courses will count toward the calculation of a student's UC GPA upon his/her admission or readmission to regular student status at UC Davis. However, the units earned do not satisfy the university residence requirement. Students registered at UC Davis may not enroll in Open Campus courses.

### **Residence Requirement**

Meet university residence requirement. No additional college residence requirements.

### **Scholarship Requirement**

Students must attain at least a 2.000 GPA for all courses required in their major. Students must also attain a 2.000 GPA in all Depth Subject Matter courses required in their major. Students who fail to maintain a 2.000 GPA in courses required for their major over two consecutive quarters may be required to withdraw from the major.

- **Repeating Courses.** Students may once repeat courses in which they received a grade of D+ or less. To repeat a course more than once, students must petition the Dean for approval prior to enrolling in the course.
- **Passed/Not Passed Grading Option.** All courses used to satisfy major requirements must be taken on a letter-graded basis, unless courses are only offered on a Passed/Not Passed basis.

### **English Composition Requirement**

The English Composition requirement may be satisfied in one of two ways:

1. Completing 8 units, to include 4 upper division units, in English composition courses with at least a C- or Passed grade from the following list: Comparative Literature 1, 2, 3, 4, English 3, Native American Studies 5, University Writing Program 1, 18, 19, 101, 102 series, or 104 series.

**OR**

2. Passing the English Composition Examination, administered by the Entry Level Writing program, upon completion of 70 units of degree credit. This examination does not yield credit. Students interested in entering the health science field should check with the Health Professions Advising office or the Biology Academic Success Center before choosing this option.

**English Composition Examination.** The no-fee, no-unit examination is typically offered on a Saturday in October, January, and April; for specific dates see <http://writing.ucdavis.edu/compexam/>.

If students choose to take this challenge exam, they are strongly advised to do so in their junior year. Register for the English Composition Examination at <http://writing.ucdavis.edu/compexam/> from the Monday before the exam date until Friday at noon or until no spaces remain. The AWPE/Upper-Division Composition Examination form, available at the UC Davis Bookstore, is required. It is recommended that students with disabilities contact the Student Disability Center 530-752-3184 and the University Writing Program 530-752-6283 at least two weeks prior to the exam date to arrange accommodations. No examinations are given during the summer.

### **Additional Bachelor of Arts Requirements**

Bachelor of Arts degrees are available in Biological Sciences; Evolution, Ecology and Biodiversity; Microbiology; and Plant Biology. These degrees offer students an opportunity to broaden their education while pursuing a rigorous life science major.

Candidates for the Bachelor of Arts degrees must complete two additional requirements.

1. **Foreign Language.** The requirement can be met in one of three ways:

- Complete with passing grades 15 quarter units of college level course work, or the equivalent thereof, in a single language.
- Attain a minimal score prescribed by the Committee on Undergraduate Curriculum and Educational Policy, in the College Entrance Examination Board Achievement Test in Foreign Language, which may be taken at any time during the student's high school career, or any other achievement test approved by the Committee on Undergraduate Curriculum and Educational Policy.

- Placement beyond the 15-unit level on a placement/proficiency examination offered by one of the foreign language departments of the University.

2. **Breadth Requirements.** Satisfaction of the campus General Education requirement (or IGETC for transfer students) in effect Fall 2011 will satisfy the Breadth requirement. Students that matriculated prior to Fall 2011 have the option of completing the Breadth Requirement specified in the College of Biological Sciences regulations prior to this revision. Completion of a minor in the humanities, social sciences or fine arts can offer structure and coherence to the courses selected for satisfaction of the requirement.

### **Declaration of Major/Undeclared—Life Sciences**

Students must declare a major by 90 units. A hold will be placed on a student's registration if he/she is still undeclared after completing 90 UC Davis units.

All changes of major and college must be completed before the beginning of the student's quarter of graduation.

Students who are enrolled in a major administered by the College of Biological Sciences and students who are Undeclared-Life Sciences see a staff adviser in the Biology Academic Success Center for their major, university, general education, and college academic advising. Master faculty advisers are also available in the department that houses their major, as listed in the catalog, or at the Biology Academic Success Center.

### **Degree Check**

Students are encouraged to meet with their academic adviser at least once a year to ensure timely graduation. Students are required to consult a Biology Academic Success Center academic adviser at three points in their academic careers:

- In their first two quarters on the Davis campus.
- Before accumulating 90 units.
- Before accumulating 135 units.
- In addition, if you are taking courses which, if passed, will cause your unit total to exceed 200 units and you intend to register for the next quarter, you must file a plan with your adviser that leads to graduation within 225 units. If the plan anticipates registering after you have accumulated 225 units, the plan must be submitted to the Dean for approval.

If you do not meet any of these advising requirements, a hold may be placed on your registration.

### **Degree Requirement Changes or Catalog Rights**

On occasion, the faculty makes changes in the requirements that students must satisfy to obtain the baccalaureate degree. So that you will not be penalized by changes that may work to your disadvantage and so that you will benefit by changes that assist you in completing your degree requirements, it is college policy that you may choose to fulfill the university and college requirements (see *General Education Requirement*, on page 107 for an exception) as stated in any UC Davis *General Catalog* in effect at the time you were registered at UC Davis. If you have transferred to UC Davis from a community college, state college, or another university, you may follow the requirements as stated in any UC Davis *General Catalog* in effect either during the three years immediately preceding your transfer to UC Davis or at the time you first registered at that

institution, whichever is most recent. Once you have chosen the year of the *General Catalog* under which you wish to be governed, you must satisfy all of the university and college requirements specified in that catalog.

With respect to the completion of your major requirements, most of the majors in the College of Biological Sciences require completion of the major degree requirements in effect at the time you officially declared your major. However, because departments differ in how they handle these matters, check with the department or major program office if you have any questions about which requirements apply to you.

## College of Engineering

### Prerequisite Requirements

Engineering is a discipline that requires mastery of prerequisite coursework before you can move forward in the curriculum. You should plan to repeat any engineering requirement in which you earned a grade of less than C-. You are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop you from a course for which you have not completed the stated prerequisites.

### Current Curriculum Requirement

Because engineering is a rapidly developing profession, the things an engineer needs to know change on an almost daily basis. To respond to this, the faculty members make changes to the curriculum on a regular basis. In order to ensure that students graduate with the most current engineering knowledge, College of Engineering students must complete the major requirements in effect in the academic year of graduation or in the immediately preceding academic year. For information about undergraduate studies in the College of Engineering, see <http://engineering.ucdavis.edu/undergraduate/>.

When degree requirements change, a transition plan is developed to ensure that students who are getting regular advising and following recommended course sequences will be able to graduate within four years. Contact your program adviser or the Engineering Undergraduate Office for more specific information or questions. The list of advisers can be found at <http://engineering.ucdavis.edu/undergraduate/advisors/>.

The faculty of the College of Engineering may prescribe special or comprehensive examinations or may otherwise test student preparation and achievement, and may specify course-work alternatives to passing such examinations.

### Engineering Design

Engineering design is the process of devising a system, component, or process to meet certain needs. Design involves a decision-making process (often iterative), in which the basic sciences, mathematics and engineering sciences are applied to convert resources optimally to meet a stated objective. Among the fundamental elements of the design process are the establishment of objectives and criteria, synthesis, analysis, construction, testing and evaluation. Specific design requirements are included in individual curriculum descriptions. In general, the design experience in the engineering programs prepares students to recognize responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in

global, economic, environmental, and societal contexts. The engineering curricula culminate in a major design experience based on the knowledge and skills acquired in earlier course work and incorporating appropriate engineering standards and multiple constraints to satisfy desired needs.

### Unit Requirements

Each candidate for the degree of Bachelor of Science in Engineering must satisfactorily complete an approved curriculum in engineering, totaling at least 180 units. No unit of coursework you complete may be used to satisfy two different degree requirements, except under any of the following conditions:

- You may use course units to satisfy both General Education 3 requirements and course requirements for the major.
- You may use course units for two different degree requirements in cases where the catalog specifically states that course units may be used to satisfy two different degree requirements.
- You may use course units for permitted double majors within the College of Engineering.

Detailed requirements for the approved curricula are given in the *Programs and Courses* chapter of this catalog; to see the courses required in your major, consult this section. The minimum number of required units varies with the curriculum. You are responsible for planning your program and satisfactorily completing all degree requirements.

You may, for good cause, request a modification of particular degree requirements by submitting a student petition. These petitions, available from your program adviser or from the Engineering Undergraduate Office, can be valuable aids in resolving individual program conflicts or other special problems. Such petitions are subject to approval by the Undergraduate Educational Policy Committee, composed of one faculty representative from each department and non-voting staff advisers. The Associate Dean for Undergraduate Studies serves as ex-officio member of this committee.

### Residence Requirement

College of Engineering students must meet the university residence requirement. There are no additional college residence requirements.

### Limitation on Credit for UC Davis Extension Courses.

Students may apply a maximum of 16 units of credit for courses taken in the Open Campus Program through UC Davis Extension towards the unit requirement of their major. Courses may be taken only when written approval has been obtained from the Associate Dean for Undergraduate Studies. The grade points earned when enrolled in Open Campus courses will count toward the calculation of the student's UC GPA upon your admission or readmission to regular student status at UC Davis. Students registered at UC Davis may not enroll in Open Campus courses.

### Scholarship Requirement

In addition to meeting the university scholarship requirement, College of Engineering students are required to maintain at least a 2.000 grade point average for all undergraduate course work within Engineering at UC Davis.

### **English Composition Requirement**

Prospective engineering employers cite the ability to write well and communicate effectively as a desirable trait. Because engineers must be able to explain complex ideas, it is critical that you pay close attention to the development of writing and communication skills. All students admitted to the University must complete the Entry Level Writing Requirement (see [page 106](#)) before credit for any composition course or general education writing experience course will be granted.

Once the Entry Level Writing Requirement has been satisfied, there are two distinct composition requirements for engineering students:

- **Lower-division composition.** This requirement can be satisfied by completion of an Advanced Placement English exam with a score of 4 or 5; International Baccalaureate credit for English 3; or completion of certain coursework with a grade of *C-* or better. Courses allowed vary by major. Please see your program adviser to determine coursework that has been approved for your major.
- **Upper division composition.** Requirements for upper division composition vary by major. Please see your program adviser to determine the coursework that has been approved for your major.

Please note that when you use coursework to satisfy either of the composition requirements, you must earn a grade of *C-* or better.

### **Electives**

Because, as an engineer, you will be a significant participant in the human setting, you will need to have a breadth of education that will allow you to deal with contemporary social issues and to understand the impact of engineering solutions in the global and societal context. To these ends, you must complete the UC Davis General Education requirement details; see [page 107](#).

Since all engineering programs are in the Science and Engineering GE topical breadth area, you will fulfill the campus GE requirements by taking courses in the Arts and Humanities and Social Sciences areas.

In satisfying the GE requirement note that (a) you must take GE courses for a letter grade, and (b) you must satisfy the Entry-Level Writing requirement before you can receive writing experience credit for any course.

Students in the College of Engineering will complete any version of the general education requirement in effect between the time of matriculation and the time of graduation. Readmitted students will complete the general education requirement in effect at the time of readmission.

### **College of Letters and Science**

#### **Unit Requirements**

A minimum of 180 units is required for the bachelor's degree. 64 units must be earned in upper division courses.

**Registration Beyond the 225-unit Limit.** You are expected to fulfill all degree requirements within the 180- to 225-unit range.

Once 225 units have been completed (excluding units awarded for College Board Advanced Placement Examinations or International Baccalaureate Examinations), you may register only with the permission. Such permission is rarely granted and then typically only

to allow completion of minimum degree requirements. You will be expected to adhere to a program of courses agreed upon and to meet other conditions that may have been set. Approval must be obtained from the Undergraduate Education and Advising Office before you will be permitted to register for courses for the quarter following completion of 225 or more units.

If you are in good standing, you will be able to complete 12 quarters or the equivalent (e.g., four years) of college work even if you have earned more than 225 units before you finish your fourth year. You must petition for continuation, however, and file the quarter-by-quarter course program you have planned.

#### **Unit Credit Limitations**

For certain courses, limits have been established on the number of units that can be counted towards the 180-unit minimum required for the degree. To avoid discovering just before graduation that you are short units, keep track of the number of units you have taken in each of the following categories.

#### **Limitation on Credit for Graduate and Professional Courses.**

Undergraduates may enroll in graduate and professional courses in the 200, 300, and 400 series subject to the restrictions described in [Academic Information, on page 83](#), in this catalog. Graduate and professional courses that have been completed will be listed on the student's transcript in the usual manner. *However, the units earned may be counted toward degree requirements only under the conditions listed below.*

Within the limitations A, B and C given below, undergraduate students in the College may count an unlimited number of units in graduate 200 series courses and up to a combined total of 9 units in 300 and 400 series professional courses toward degree requirements. These units, however, are not counted as upper division units unless this is granted by petition to the Undergraduate Education and Advising Office.

**A.** The recommendations of the instructor in the course and the department chairperson—in addition to approval from the Undergraduate Education and Advising Office—must be obtained by petition in order to receive credit toward the degree for the following kinds of courses:

- All graduate courses 200–298, whether offered by a department or program outside of or within the College of Letters and Science
- All professional courses 300–398 for teachers offered outside of the College of Letters and Science
- All postgraduate professional courses 400–498 offered outside of the College of Letters and Science
- All variable unit courses 300–398 and 400–498 offered within the College of Letters and Science

**B.** The minimum eligibility conditions for an undergraduate student in the College to petition for degree credit for a 200, 300, or 400 series course are a UC grade point average of 3.300 and completion of 18 upper division units basic to the subject matter of the course. These eligibility conditions may be waived, however, upon the recommendation of the course instructor and concurrence of the department chairperson if the student's preparation warrants exception.

**C.** Undergraduates in the College cannot receive degree credit for special study courses 299, 399, or 499.

**Limitation on Credit for Units Graded P.** Excluding courses that are graded on a Passed/Not Passed (P/NP) basis only, the number of units graded P that may be accepted towards a degree in the College of Letters and Science is limited to not more than one fourth of the units completed in residence on the UC Davis campus.

The Academic Senate limits the total number of courses graded P including units earned in courses graded "P/NP only," to one third of the units completed on the UC Davis campus. This limitation applies to all UC Davis undergraduates, including Letters and Science students.

#### **Limitation on Credit for UC Davis Extension Courses.**

A. UC Davis Extension courses with a designator of "X." Students may apply credit earned through lower division and upper division UC Davis Extension "X" courses towards the 180-unit requirement only with written approval from the dean prior to registration. The degree credit allowed by the dean for such courses is usually less than the unit value listed in the course description. Additional limitations on UC Davis Extension "X" courses include: a maximum of 9 units may be offered for elective credit only and may not be applied toward fulfillment of the Area, Foreign Language, Upper Division, or Residence requirements of the College.

B. UC Davis Extension courses with a designator of "XD." Students may apply credit earned through lower division and upper division UC Davis Extension "XD" courses towards the 180-unit requirement. Additionally, credit from such courses may be applied toward fulfillment of all university, campus, college and major unit and subject matter requirements—including the Area, Foreign Language, Upper Division and Residence requirements of the College—in the same manner that the corresponding regular UC Davis course is so accepted.

C. UC Davis Extension courses with a designator of "XDC" (Open Campus (Concurrent) Program). Subject to the following conditions, students may apply credit earned through lower division and upper division UC Davis Extension Open Campus (Concurrent) courses—i.e., those bearing the "XDC" designator—towards university unit and subject requirements, and, effective Fall 2003, the calculation of the student's UC GPA, upon admission or readmission to regular student status at UC Davis.

- Students on leave of absence and regular status students when matriculated, or regular status students for a period of one calendar year following the last term of regular enrollment at UC Davis, may not enroll in Open Campus (Concurrent) courses. Exceptions to this policy for undergraduate students may be made only under extraordinary circumstances by petition with prior approval by the Undergraduate Education and Advising Office and the Dean of UC Davis Extension.
- Concurrent ("XDC") courses do not count toward satisfaction of the University residence requirement or the residence requirements of the campus or the college.
- Concurrent ("XDC") courses may constitute at most half of the units offered in satisfaction of the upper division requirements of the major.
- In the event that the faculty of the college imposes further restrictions on the number of units of UC Davis Extension Open Campus (Concurrent) course work that may be applied to undergraduate degree programs, the allowable number of units of course work will be determined chronologically, starting with the course completed first. Grade point credit for such

courses will be determined in the same manner.

**Other Unit Credit Limitations.** The following are additional courses that have limits on the number of units that can be counted toward your degree.

- **Internship courses (numbers 92, 192):** 12 units maximum including internship units taken at other institutions; see Non-standard courses
- **Music 130, 131, 140-150 (combined):** 19 units maximum
- **Nonstandard courses (92, 97T, 97TC, 99, 192, 194H, 197T, 197TC, 199 and similar courses):** 30 units maximum or one-sixth of the units taken at UC Davis, whichever is the smaller; note the separate unit limits on internship, special study and tutoring courses; and major limitations
- **Physical Education 1 and 6 (combined):** 6 units maximum
- **Special Study courses (99, 194H, 199):** 5 units maximum in any one quarter; see Nonstandard courses
- **Tutoring courses (97T, 97TC, 197T, 197TC):** 10 units maximum; see Nonstandard courses, above

#### **Residence Requirement**

While registered in the College of Letters and Science, a minimum of 27 upper division units, including 18 upper division units in the major, must be completed on the UC Davis campus; work completed while registered in the UC Study Abroad Program or the UC Davis Extension Open Campus Program does not satisfy campus or College Residence requirements.

#### **Scholarship Requirement**

The minimum grade point average to satisfy the scholarship requirement is 2.000 for all courses counted toward the major and for all upper division courses used to satisfy major requirements. Only grades earned in courses taken at UC Davis will be included in the grade point computations. To obtain these minimum averages in the major, you may repeat courses that are graded D or F. If you have to repeat a course more than once, you need prior approval from the Undergraduate Education and Advising Office.

#### **English Composition Requirement**

The English Composition requirement can be met in one of two ways:

1. By passing the English Composition Examination upon completion of 70 units of degree credit (the examination does not yield credit);

**OR**

2. By completing with a grade of C- (or P) or better
    - a. One course from English 3, Comparative Literature 1, 2, 3, 4, Native American Studies 5, or University Writing Program 1, 1V, 1Y;
- and
- b. One course from University Writing Program 101, 102 series, or 104 series, which must be taken after 84 units have been completed.

**Transfer Courses in English Composition.** Transfer courses considered to be equivalent or comparable to English 3, Comparative Literature 1, 2, 3, 4, Native American Studies 5, or University

Writing Program 1, 1V, 1Y, 101, or 104 series, will be accepted toward satisfaction of the English Composition requirement. Note that University Writing Program 101 and 104 series courses or the equivalent must be taken after you have completed 84 units of transferable degree credit.

If your transfer work does not include an acceptable English composition course taken after you had completed or accumulated 84 units, you may fulfill the requirement by examination (see below) or take one course from University Writing Program 101, 102 series, or 104 series at UC Davis.

**Upper Division Composition Examination.** The no-fee examination is typically offered on a Saturday morning in October, January and April. No examinations are given during the summer.

For specific examination dates, instructions, and to sign up to take an examination, see the University Writing Program-Upper Division Composition Exam Information at <http://writing.ucdavis.edu/compexam>. It is recommended that students with disabilities contact the Student Disability Center at 530-752-3184 and the Entry Level Writing Program Office 530-752-0450 at least two weeks prior to the exam date to arrange accommodations.

### **Area (Breadth) Requirement**

The College Breadth Requirement promotes the intellectual growth of students by asking them to acquire a broader background of knowledge than is provided by the usual major. The Breadth requirement also guides students in exploring the interdependence of knowledge.

**A.B. Degree.** Satisfaction of the campus General Education requirement.

**B.S. Degree.** A total of 90 units in natural sciences/ mathematics; units used in satisfaction of the campus General Education requirement in Science and Engineering topical breath may also be used to satisfy this requirement.

Courses numbered 92, 97T, 97TC, 98, 192, 197T, 197TC, 198 and from 200 through 499 cannot be counted toward satisfaction of the natural sciences/mathematics Area requirement. A maximum of 10 units in special study courses (99, 194H, 199) may be counted toward that portion of the Area requirement. Subject to the restrictions just listed, courses acceptable for fulfilling the 90-unit natural sciences/mathematics Area requirement are:

### **Natural Sciences and Mathematics**

- Anatomy, Physiology and Cell Biology 100
- Anthropology 1, 5, 15, 151, 152, 153, 154A, 154BN, 156A, 156B, 157, 158
- Astronomy
- Avian Sciences 13
- Biological Sciences
- Cell Biology and Human Anatomy 101, 101L
- Chemistry
- Engineering 6, 10, 35, 102
- Engineering: Biomedical 126
- Engineering: Computer Science 10, 30, 40, 50, 60, 120, 122A, 122B, 140A, 140B, 142, 150, 152A, 152B, 153, 154A, 154B, 158, 160, 163, 165A, 165B, 170, 175, 177, 178
- Engineering: Electrical and Computer 70, 170, 173A
- Entomology 10, 100, 153
- Environmental and Resource Sciences 30, 131

- Environmental Science and Policy 30, 100, 121
- Environmental Toxicology 101
- Evolution and Ecology
- Exercise Biology 101, 103, 106, 106L, 110, 111, 112, 113, 115, 116, 117, 126
- Fiber and Polymer Science 110
- Food Science and Technology 100A, 100B, 101A, 101B
- Geology
- Integrated Studies 8A
- Mathematics
- Microbiology
- Molecular and Cellular Biology
- Neurobiology, Physiology, and Behavior
- Nutrition 10, 111AV, 111B
- Pathology, Microbiology, and Immunology 126
- Physical Education 133, 135
- Physics
- Plant Biology
- Psychology 41, 100, 101, 103A, 103B, 104, 113, 121, 122, 123, 124, 126, 127, 129, 130, 131, 135, 146, 180B
- Statistics
- Wildlife, Fish, and Conservation Biology 10

### **Foreign Language Requirement; A.B. and B.A.S. Degrees**

A key component of liberal education, the study of another language exposes students to a ubiquitous and highly diverse component of human behavior and interaction. Language learning enables students to communicate effectively in an increasingly internationalized world, enhances their ability to understand ways of thinking different from their own, gives them direct access to cultural production from another time and place, awakens in them an awareness of the conditioned nature of their assumptions about the world, and trains them to cope more effectively with intellectual and practical problems they may face in their future careers.

The College of Letters and Science encourages its students to acquire functional proficiency in at least one language other than English before graduating. At a minimum, the College requires A.B. candidates to complete three sequenced quarters (15 units) of courses, or its equivalent, in one foreign language. B.S. candidate requirements are determined by their respective major program.

### **Languages Satisfying the Requirement**

The Foreign Language Requirement may be satisfied in any language offered at UC Davis, including ancient languages, or which is normally taught at—and for which transfer credit is allowed—from another institution, including American Sign Language. Students may also satisfy this requirement by examination in a language not offered on the UC Davis campus (see below).

### **Satisfaction of the Requirement**

**At UC Davis or Another Accredited Institution.** You may satisfy the requirement by taking 15 quarter units of one foreign or classical language offered at UC Davis. You may also fulfill this requirement by taking the equivalent number of transferable quarter units in one foreign language at an accredited institution.

Transfer students should consult the Transfer Credit Evaluation, which is issued by the Deans' Office within a quarter after their first enrollment at UC Davis. Students planning to continue to study the same language at UC Davis must consult the relevant language coordinator.

If you have successfully completed the second or third year of a language in the tenth or higher grade in high school, you may receive unit credit for course 1 of that language when taken at UC Davis, but the grading mode will be P/NP only. Although a Passed or Not Passed grade will be charged to your P/NP option, no petition is required; see [Passed/Not Passed \(P/NP\) Grading, on page 91](#).

**Through Study Abroad.** Certain study abroad programs offered by UC Davis through the Study Abroad Center, UC Education Abroad Program and other accredited institutions may be used to satisfy the requirement. Some of these programs do not have a language prerequisite, but others do. If you intend to apply for a study abroad program with a language prerequisite, you should plan on completing the relevant foreign language requirement by the end of your second or third year, depending on the program.

**With the Intersegmental General Education Transfer Curriculum (IGETC).** IGETC is a series of courses which prospective transfer students attending California community colleges may complete to satisfy the lower division breadth/general education requirements at the University of California. Students may satisfy the Foreign Language requirement by attaining certification of IGETC completion.

**By Examination: Proficiency Exam.** The UC Davis Language Center (DLC) offers proficiency tests in numerous languages. A proficiency test does not yield unit credit—it only determines whether the Foreign Language requirement has been met or at which point in the language sequence you should enroll. Students must follow the language program's placement policy if they decide to study the language at UC Davis.

**By Examination: Standardized Tests.** College Board Subject Test: Earning a qualifying score of at least 550 on a College Board Foreign Language Subject Test satisfies the requirement. This test may be taken at any time during your high school career. Once your score is on file at Undergraduate Admissions, notify the Letters and Science Deans' Office so that satisfaction of the College requirement can be noted on your record.

**College Board Advanced Placement Examination.** A score of 5, 4 or 3 on any foreign language College Board Advanced Placement Examination, with the exception of Latin, taken in high school will satisfy the Foreign Language requirement.

**International Baccalaureate Higher Level Examination.** A score of 7, 6, or 5 on the French A1, A2, or B Examination, the German A1, A2 or B Examination, the Italian A1 Examination, the Latin Examination, the Portuguese A1, A2 or B Examination, or the Spanish A1 Examination taken in high school will satisfy the Foreign Language requirement.

**By Examination: Other means.** If you have not completed the required level language course, but assume you have attained equivalent language fluency and cultural knowledge, you may satisfy the language requirement by passing a proficiency examination. For more information, consult the appropriate foreign language department.

You may validate your knowledge of a language acquired by any means before matriculating at UC Davis by taking a proficiency test or another form of evaluation (if available in the relevant language department). A test may not be taken, however, in a language for which you have already received degree credit.

### **Major Degree Certification**

Requirements for major programs are described in the [Undergraduate Courses](#) chapter of this catalog. These requirements are fulfilled by completing a major program offered by a teaching department or program committee in the College of Letters and Science (see the list of majors) or an individual major program approved by the College's Committee on Individual Majors.

No more than six units in internship courses (numbered 92, 192, or similar internship courses) may be accepted in satisfaction of the requirements of major programs. Courses numbered 97T, 97TC, 197T and 197TC do not satisfy unit or course requirements in the major.

### **Degree Check**

Before the beginning of your senior year, take some time to consider your goals and to plan the academic program for your final year as an undergraduate. To plan properly and to ensure that you get the most out of your remaining education and complete all graduation requirements as well, you should know what requirements remain unsatisfied. To help you in these efforts, the Undergraduate Education and Advising Office provides on its website informational materials and instructions on how to evaluate your progress on college and university requirements; see <http://www.ls.ucdavis.edu/advising/>. Many departments provide similar information regarding your major requirements.

Once you have completed 90 units of degree credit, you should contact your departmental adviser for a check of your major requirements. At approximately this point, you will also be required to request an official degree check summarizing your progress in fulfilling college and university requirements from the Undergraduate Education and Advising Office; see <http://ls.ucdavis.edu/advising/academic-advising/mandatory-adv.html> for additional information.

### **Degree Requirement Changes**

On occasion, the faculty makes changes in the requirements that students must satisfy to obtain the baccalaureate degree. So that you will not be penalized by changes that may work to your disadvantage and so that you will benefit by changes that assist you in completing your degree requirements, it is College policy that, unless otherwise specified by the Davis Division of the Academic Senate, you may choose to fulfill the university and College requirements as stated in any UC Davis *General Catalog* in effect at any time you were registered as a full-time student at a postsecondary institution of higher education; e.g., community college, college or university.

Once you have chosen the year of the *General Catalog* under which you wish to be governed, you must satisfy all of the university and college requirements specified in that catalog. With respect to the completion of your major requirements, most of the majors in the College of Letters and Science require completion of the major degree requirements in effect at the time you officially declared your major. However, because departments differ in how they handle these matters, check with the department or major program office if you have any questions about which requirements apply to you.



GRADUATE STUDIES

## GRADUATE STUDIES

250 Mrak Hall  
530-752-0650; <https://gradstudies.ucdavis.edu>

UC Davis offers advanced degrees in nearly 100 graduate programs. A student's graduate study is guided by either departments or graduate groups. Graduate groups are composed of individual faculty members from multiple departments with similar academic interests. The group structure, used extensively at UC Davis, permits faculty to be affiliated with graduate programs in more than one discipline and offers students an interdisciplinary graduate experience that crosses the administrative boundaries of the various departments, colleges, schools, and sometimes campuses. In keeping with UC Davis' progressive spirit, the group structure also allows for evolution of established degree programs and facilitates the development of new ones. More than half of the graduate programs at UC Davis are organized as graduate groups. You will find a complete list of graduate degrees under [Degrees Offered by UC Davis, on page 15](#).

Graduate study is governed by the Graduate Council, a standing committee of the Davis Division of the Academic Senate and by the dean of Graduate Studies. A university-wide Coordinating Committee on Graduate Affairs determines general policies and establishes common procedures.

## PREPARING FOR AN ADVANCED DEGREE

Admission to a graduate program at the University of California requires a bachelor's degree that is comparable in quality to a degree from the University of California both in distribution of academic subject matter and in scholarly achievement.

The primary requirement for admission to any program is evidence of intellectual achievement and promise. Your application will be evaluated first on the basis of your transcript to assure that your qualifications meet minimum standards as set by the university and UC Davis Graduate Council. Generally, you must have a minimum B average in undergraduate course work from an institution of acceptable standing to be considered for admission. UC Davis also requires a Statement of Purpose and a Personal History Statement from each applicant. International applicants must demonstrate the ability to understand and use English by submitting TOEFL or IELTS scores. Graduate programs frequently require submission of additional materials such as Graduate Record Examination (GRE) scores, letters of recommendation, and portfolios or examples of written work to assist in selecting from among many highly qualified applicants. Admission to graduate study is limited by the number of spaces available in major programs. Not all eligible applicants can be admitted.

UC Davis is committed to maintaining excellence, preserving fairness and promoting diversity in its student population. In addition to an applicant's past scholastic achievement, admissions criteria include an applicant's potential for service in the field, keeping in mind the needs of our society and of underrepresented and disadvantaged communities. Evaluation criteria also attempt to take into account any prior disadvantages applicants have overcome that may bear on future achievements and services.

## APPLYING FOR ADMISSION

To apply for admission, please see <https://gradstudies.ucdavis.edu>.

Each program to which you apply must receive a complete application, including the nonrefundable application fee of \$90 (U.S.) or \$110 (international).

To apply for fellowship, please see <https://gradstudies.ucdavis.edu>.

For application deadlines, please go to the Graduate Studies website at <https://gradstudies.ucdavis.edu/prospective-students/admissions-application/deadlines>. It is also recommended that you check the website of the program to which you are applying for their application deadlines. No applications are accepted after the published program-specific deadline.

### About Admissions

Applications are accepted for fall quarter only. You may apply for admission to graduate study at <https://gradstudies.ucdavis.edu>.

You should begin the application process as early as possible in the academic year since many programs have early deadlines. In addition, your chances for appointment as a teaching assistant or graduate student researcher, or of receiving financial support, are enhanced by applying early. The application deadlines are available on the Graduate Studies website as noted above or until your proposed graduate program is full, whichever occurs first.

The Graduate Admissions Advisory Committee for the program will submit its recommendation and evaluation to the Office of Graduate Studies; final admission decisions rest with the Dean of Graduate Studies. This approval procedure applies to all applicants, including those seeking a transfer to UC Davis from another UC campus.

Applications for the degrees of Juris Doctor, Doctor of Medicine, Doctor of Veterinary Medicine, Master of Business Administration, Master of Professional Accountancy, and Master of Preventive Veterinary Medicine must be filed directly with the appropriate professional school.

### Readmission

If you were formerly registered at UC Davis as a graduate student and wish to return to pursue the same degree objective in the same major, you must apply for readmission and pay the readmission application fee of \$70. The readmission application must be filed with the Office of Graduate Studies by the tenth day of instruction of the quarter. If you are seeking to return to a new degree program and/or new major, you must apply for admission along with other new applicants. Apply at <https://gradstudies.ucdavis.edu>. Transcripts of any college-level coursework undertaken since you were last registered in graduate status at UC Davis must be presented with the application. There is no assurance of reentry, as applicants for readmission will be considered in competition with other applicants for the program.

## International Students

<http://intlstudents.ucdavis.edu>

Assessment of a foreign degree is based on the characteristics of the national system of education, the type of institution attended, and the level of study completed.

If you are an international student with credentials from universities outside the U.S., you should begin the application process as early as one year in advance. The Office of Graduate Studies will determine your eligibility using U.S. guidelines for credential evaluation. International students are also required to complete the online application process and pay the nonrefundable application fee. International students must apply at <https://gradstudies.ucdavis.edu>.

**English Requirement.** Applicants whose native language and language of prior instruction is not English must take the TOEFL or IELTS. The minimum score required for admission to graduate study at UC Davis is total score of 550 for the paper test or a total score of 80 on the Internet-based test for TOEFL, or band score of at least 7.0 on a 9-point scale for IELTS. TOEFL and IELTS scores are valid for two years only. Some programs require higher scores; for more information, see <https://gradstudies.ucdavis.edu/programs>. UC Davis does not offer conditional admission on the basis of future English language test scores. TOEFL scores must be reported electronically by ETS. The score report is required before application processing begins.

**TOEFL Scores.** The Test of English as a Foreign Language (TOEFL) is given by Educational Testing Service (ETS), TOEFL Services, PO Box 6151, Princeton NJ 08541-6151, 609-771-7100. Request information from [toefl@ets.org](mailto:toefl@ets.org) or see <http://www.ets.org/toefl>.

**IELTS Scores.** The Academic Modules of the International English Language Testing System (IELTS) are designed by the University of Cambridge Local Examinations Syndicate and administered by the British Council worldwide. You are responsible for providing us with an official Test Report Form (TRF) of your IELTS. Remember to order the TRF when you register to take the test. To register for the IELTS, see <http://www.ielts.org> or contact the IELTS Subject Officer, University of Cambridge, Local Examinations Syndicate, 1 Hills Road, Cambridge, CB1 2EU, United Kingdom.

**Visas.** If you need a certificate of eligibility for a student visa issued by UC Davis, you will be required to complete a certification of finances form showing the availability of sufficient funding for your graduate program. For complete details, see [Services for International Students and Scholars \(SISS\)](#), on page 81.

## PROGRAM OF STUDY

New students are assigned an adviser within the appropriate department or graduate group who assists them in planning a program of study. The program will depend to some degree on the student's undergraduate training and may include undergraduate courses to remove deficiencies. Each student must satisfy the degree requirements as stated by the program and found at <https://gradstudies.ucdavis.edu/programs>.

Additional requirements for study may be established by the department or group and approved by the Graduate Council. These requirements often include a core of required courses, but considerable flexibility is permitted to suit individual needs. Undergraduates at UC Davis who plan to pursue graduate study

should consult with their major adviser at the end of their junior year or the beginning of their senior year to guarantee adequate preparation.

A graduate degree is awarded to recognize a student's command of a wide range of knowledge in an academic field. It is not awarded merely for fulfillment of technical requirements, such as residence or the completion of specific courses.

## Master's Degree

Students working toward a master's degree must be registered for at least three full-time quarters. Two regular six-week Summer Sessions may count as the equivalent of one quarter. Usually, all work for the master's degree is done in residence on the UC Davis campus; however, some work taken elsewhere may be credited toward your degree with the consent of the graduate adviser and the Associate Dean for Graduate Students. The limit for such transfer credit is 6 units from another institution, or 12 concurrent units (Open Campus enrollment), or up to one half of the unit requirement if the courses were taken at another UC campus-providing the units were not used to satisfy requirements for another degree.

A master's degree may be awarded upon completion of one of two basic plans in which either a thesis or a comprehensive examination is required.

## Doctoral Degree

The Doctor of Philosophy degree, as granted at the University of California, means that the recipient possesses knowledge of a broad field of learning and has given evidence of distinguished attainment in that field; it is a warrant of critical ability and powers of imagination and synthesis. It means, too, that the candidate has presented a dissertation containing an original contribution to the knowledge in the chosen field of study.

Students working toward a doctorate must be registered for a minimum of six full-time quarters. Experience indicates that it takes considerably longer than this to complete a degree program. Two consecutive regular Summer Sessions may count as the equivalent of one regular quarter.

There is no university unit requirement for the doctoral degree. However, individual programs have course requirements that must be completed before admission to the Qualifying Examination.

The Qualifying Examination is administered by a committee appointed by the dean of Graduate Studies. The examination is intended to demonstrate critical thinking ability, powers of imagination and synthesis and broad knowledge of the field of study. Upon recommendation of the Qualifying Examination Committee, and with the approval of the Graduate Council, the examination may be repeated one time.

After successful completion of the Qualifying Examination, the student must file for Advancement to Candidacy for the degree. At this time, a committee is appointed to direct the research problem and guide in the preparation of the dissertation.

Graduate students in certain doctoral programs may participate in a Designated Emphasis, a specialization that might include a new method of inquiry or an important field of application that is related to two or more existing doctoral programs. The Designated Emphasis is awarded in conjunction with the doctoral degree and is signified by a transcript designation; for example, "Ph.D. in History with a Designated Emphasis in Critical Theory." Programs

approved as Designated Emphases include African American and African Studies, Biology of Vector-borne Diseases, Biophotonics, Biotechnology, Classics and Classical Receptions, Critical Theory; Feminist Theory and Research; International and Community Nutrition; Native American Studies; Organism-Environment Interaction; Reproductive Biology; Second Language Acquisition; Stem and Progenitor Cells; Studies in Performance and Practice; Translational Research; and Writing, Rhetoric, and Composition Studies.

## INTERCAMPUS EXCHANGE PROGRAM

A graduate student registered on any campus of the University of California may become an intercampus exchange student with the approval of the graduate adviser, the chairperson of the department or group on the host campus, and the Dean of Graduate Studies on both the home and the host campuses.

An intercampus exchange student has library, health service and other student privileges on the host campus, but is considered a graduate student in residence on the home campus. The grades obtained in courses on the host campus are transferred to the home campus and entered on the student's official graduate transcript.

Application forms may be obtained from the Office of Graduate Studies website (<https://gradstudies.ucdavis.edu>) and must be submitted five weeks before the beginning of the quarter in which you wish to participate in the program. Petitions received after the first day of the quarter will not be processed.

## FELLOWSHIPS, ASSISTANTSHIPS AND LOANS

<https://gradstudies.ucdavis.edu/current-students/financial-support>

Financial support for graduate study at UC Davis is available in several forms: teaching and research assistantships, financial aid and fellowships/scholarships. For more information, see <https://gradstudies.ucdavis.edu/current-students/financial-support>.

Financial aid is awarded on the basis of demonstrated financial need and is administered by the Financial Aid and Scholarships Office. Federal financial aid includes student loans, grants and work-study funding. You may apply for financial aid before you have been admitted. To be considered for financial aid, or for any awards based on financial need, you must file a "Free Application for Federal Student Aid" (FAFSA), at <http://www.fafsa.gov> no later than March 2, prior to the fall quarter enrollment. Your application will be used to determine financial need only. Contact the Graduate Financial Aid Office for information regarding loans, grants and work-study at <http://financialaid.ucdavis.edu/graduate>.

Graduate fellowships are awarded primarily on the basis of scholarly accomplishment and promise of outstanding academic and professional achievement. Fellowship awards can include a stipend, fees and/or Nonresident Supplemental Tuition. Considered in evaluations are the Graduate Record Examination (GRE) scores, undergraduate and graduate grade point averages, academic transcripts, statement of purpose, letters of recommendation and other documentation such as publications or awards. The minimum cumulative undergraduate or graduate grade point average required for a stipend, Nonresident Supplemental Tuition fellowships or in-state fee award is 3.000 (A=4.000).

UC Davis has a single online application system for the admission application and for the student fellowship application. To apply for fellowship, see <https://gradstudies.ucdavis.edu>.

For fellowship application deadlines, please go to the Office of Graduate Studies website at <https://gradstudies.ucdavis.edu/prospective-students/admissions-application/deadlines>. It is also recommended that you check the website of the program to which you are applying for their fellowship application deadline.

## GRADUATE ACADEMIC CERTIFICATE PROGRAM

A Graduate Academic Certificate (GAC) program is a structured sequence of courses and requirements that focus on a specialty or area of expertise not offered by a regular graduate degree program. GACs are administered by a UC Davis instructional unit (professional school, department, graduate group or a designated emphasis program) and are an additional sequence of training and expertise for graduate students enrolled in a degree program.

GACs consist of a minimum of 12 units of graduate level instruction and are recognized by transcript notation and an official certificate issued by UC Davis with the gold seal of the University of California. GAC programs include Conservation Management, Development Practice, Landscape Architecture and Environmental Design, and Second Language Acquisition.

For more information, see <https://gradstudies.ucdavis.edu/programs/graduate-academic-certificates>.

## GRADUATE CERTIFICATE PROGRAM FOR ENGINEERS

For engineers who already have a degree, the College of Engineering offers Graduate Certificate Programs in various fields of Engineering. The certificate programs consist of course work in selected engineering subjects and require fewer units than the degree programs. The purpose of the Graduate Certificate Program is to provide practicing engineers with an opportunity to develop additional expertise in specific areas and to explore new fields of technical interest.

General requirements for the programs are:

- 15 or 16 units of specified graduate course work, or a combination of specified graduate and undergraduate course work.
- Admission to Graduate Studies.

Further information on the Graduate Certificate Programs may be found within the graduate programs of the College of Engineering; see <http://engineering.ucdavis.edu/graduate>.

## SEMINAR ON COLLEGE TEACHING

Center for Educational Effectiveness  
[http://cee.ucdavis.edu/instructional\\_success/courses.html](http://cee.ucdavis.edu/instructional_success/courses.html)

The Seminar on College Teaching (2 units, S/U grading) introduces graduate students to the research-based principles and practices of effective teaching. Using engaging activities, discussions, and readings, participants will develop essential skills for designing, teaching, and assessing effective courses. The seminar covers a broad range of topics related to college-level teaching, including: objectives of higher education, how students learn, facilitating active learning, meaningful forms of assessment, integrating tech-

nology, creating positive learning environments, and fostering diversity.

Participants meet for weekly two-hour sessions. Participants select and complete several assignments that are designed to be practically useful for participants own teaching as well as for an academic job search. Sample assignments include preparing a lesson

plan, micro teaching session(s), designing a syllabus, and writing a teaching philosophy statement.

All participants who complete all course requirements will earn a certificate of completion that is appropriate to include in a teaching portfolio and curriculum vitae. The course is also open to post-docs, who can earn a certificate for participating instead of course credit.

<b><i>Graduate Student Deadlines*</i></b>									
	<b>Fall 2016</b>	<b>Winter 2017</b>	<b>Spring 2017</b>	<b>Summer 2017</b>	<b>Fall 2017</b>	<b>Winter 2018</b>	<b>Spring 2018</b>	<b>Summer 2018</b>	<b>Fall 2018</b>
Deadline for students who expect to complete work for master's degrees to file applications for candidacy with master's degrees to file applications for candidacy with the dean of Graduate Studies	Aug 5	Oct 28	Jan 27	May 12	Aug 4	Oct 27	Jan 26	May 11	Aug 3
Deadline for candidates for master's degrees to file thesis with the dean of Graduate Studies	Dec 2	Mar 10	May 26	Sep 1	Dec 8	Mar 9	May 25	Aug 31	Dec 7
Deadline for candidates for master's degrees to take comprehensive examination	Dec 9	Mar 24	Jun 15	Sep 15	Dec 23	Mar 23	Jun 14	Sep 14	Dec 14
Deadline for students who expect to complete work for the degrees of Doctor of Philosophy and Doctor of Engineering to file applications for candidacy with the dean of Graduate Studies	Aug 5	Oct 28	Jan 27	May 12	Aug 4	Oct 27	Jan 26	May 11	Aug 3
Deadline for candidates for the degrees of Doctor of Philosophy, Doctor of Education, and Doctor of Engineering to file dissertation with the dean of Graduate Studies	Dec 2	Mar 10	May 26	Sep 1	Dec 8	Mar 9	May 25	Aug 31	Dec 7

\* Deadlines are subject to change without notice.



SCHOOL OF EDUCATION

## SCHOOL OF EDUCATION

School of Education  
School of Education Building  
530-752-0757; <http://education.ucdavis.edu>

The School of Education offers a wide range of academic and professional development programs that prepare teacher and administrative leaders for the world of public education (P-16), as well as researchers and university faculty. Hallmarks of our work include research that is integrated with practice and policy; deep, sustained engagement with schools and communities; and authentic, collaborative partnerships with those who share our goals.

Through our Ph.D., Ed.D. and M.A. programs, we prepare students to take leadership roles in strengthening schools, community colleges and universities, advancing research and scholarship, and improving education policy and practice. In our credential program (Teaching Credential/M.A.), we prepare students to become teacher leaders and educational advocates for all children.

### PROGRAMS OF STUDY

**The Minor in Education** is considered a foundation for undergraduates who wish to obtain a teaching credential; enter any education-related field such as speech therapy, school counseling, occupational learning, or social work; obtain a master's degree in education or a related field; pursue a doctoral degree in education; or develop a better understanding of issues confronting education today. Education Minor coursework focuses on social foundations of education, psychology of learning, schools as institutions, challenges of educational assessment, and educating diverse populations in a wide variety of disciplines and contexts. As part of the Education Minor, students also complete an internship in a local K-12 school or other learning context.

Undergraduates who are interested in exploring teaching mathematics or science in public schools should contact the MAST Program (<http://mast.ucdavis.edu>) at their first opportunity. The MAST Program offers seminars that give participants experience in elementary, middle school, and high school classrooms. MAST advisers can help students combine the prerequisites for a credential program with General Education requirements. The Natural Sciences major is sound preparation for teaching the science disciplines offered in middle and high schools. A major in Mathematics will provide the broad understanding needed to teach in public schools.

**The Master of Arts in Education** provides a course of study for examining research and theory about learners, teachers, schools, and related social institutions. The program prepares professionals to conduct research about the education of children, youth, and adults in a multicultural society. Graduates may assume leadership positions in school districts, state education agencies, and private organizations concerned with instructional research, policy and practice.

**The M.A. Program in Education** offers (1) a general track that serves a broad range of student research interests and career plans, and (2) an M.A./Credential track that integrates the M.A. with the Teaching Credential and focuses particularly on classroom-based research.

**The Integrated Teaching Credential with Master's Degree Program** offers an opportunity for qualified students to complete the requirements for both a Masters of Arts in Education degree and a Multiple Subject OR Single Subject Credential in English, mathematics, science, social science or agriculture in a 15-month, five-quarter program. A bilingual authorization in Spanish is available to credential candidates in both the elementary and secondary programs.

The Credential Program prepares students for the teaching profession by immersing them in the total environment of a public school classroom while enrolled in required coursework. The coursework incorporates a theoretical-practical approach to the teaching-learning process, encouraging close interactions among teacher candidates and teacher education faculty. Students complete requirements for the M.A. degree during two part-time quarters following the credential year. This coursework introduces the integration of research into teaching practice, making teachers more informed and pro-active practitioners.

**The Capital Area North Doctorate in Educational Leadership (CANDEL)** program leading to a Doctor of Education (Ed.D.) degree, is intended primarily for working professionals in schools, community colleges, and related educational capacities that reside in the greater Sacramento Valley, Bay Area, and Northern California. Graduates of this program will be prepared to lead in educational environments that promote learning, equity and achievement for all students. Armed with both real-world, problem-based learning, and scholarship skills, program graduates will be uniquely ready to manage the complexities of educational organizations, effect school change processes and shape the educational policies that bear on the practice of education in the public setting.

**The Ph.D. in Education** is a multidisciplinary program offered by the Graduate Group in Education, with faculty drawn from education, mathematics, science, social science and humanities units throughout the UC Davis campus. The program provides a challenging course of study for examining research and theory about learners, teachers, schools and related social institutions. Through coursework, apprenticeships and mentoring, Ph.D. students are prepared to conduct research and teach about the education of children, youth and adults in a multicultural and multilingual society. Graduates of the program have assumed faculty positions in universities, as well as other leadership positions in universities, school districts, state education agencies and in private organizations that support teaching and learning in schools and communities. The program offers five areas of emphasis: Language, Literacy and Culture; Learning and Mind Sciences; Mathematics Education; Science/Agricultural Education; and School Organization and Educational Policy.

## PREPARING FOR THE STUDY OF EDUCATION

### Teaching Credential/M.A. Degree Program

Academic preparation for the Teaching Credential Program includes a completed bachelor's degree and a GPA of at least 3.000. For the Multiple Subject credential, many undergraduate majors are appropriate preparation for the program. For Single Subject credential candidates, we recommend an undergraduate major in the intended area of secondary teaching. Use undergraduate internship opportunities to gain classroom experience in the grade levels at which you wish to teach. In addition to these general requirements, learn about current state and UC Davis credential prerequisites at the School of Education website or call our Student Services Office.

- Classroom experience in the appropriate grade levels
- U.S. Constitution course
- Specific preparatory coursework; see adviser for details
- California Basic Skills Requirement
- For the elementary credential program, the California Subject Examination for Teachers (CSET)
- For secondary credential programs, approved subject matter coursework or the California Subject Examination for Teachers (CSET) for the appropriate subject

Applicants are encouraged to have program prerequisites and testing requirements completed prior to submitting an application. Credential requirements are revised by the State of California. To obtain the most current information, students considering a career in teaching are encouraged to consult with the School of Education advisers throughout their undergraduate career.

**M.A. in Education Degree Programs.** Applicants to the General Track M.A. must have completed an undergraduate degree with a major in a field that supports their intended area of emphasis. A minimum undergraduate GPA of 3.000 is necessary for graduate admission at the University of California, Davis. Please consult with advisers in the School of Education regarding additional testing or supplemental information that may be required for application to a specific program.

**Ed.D. Degree (CANDEL).** Applicants to the CANDEL program must meet general admission requirements for graduate study at the University of California. Requirements include a bachelor's and master's degree (or equivalent) from an accredited institution, and a GPA of at least 3.000. In addition, applicants will have demonstrated prior experience in administrative or leadership roles in an educational institution or related areas.

**Ph.D. Degree.** Applicants to the Ph.D. program in Education must have a bachelor's degree, and normally will have completed a master's degree (or equivalent) in a field that supports their intended area of emphasis. A minimum GPA of 3.000 in previous undergraduate coursework is required for graduate admission at the University of California, Davis. Applicants must demonstrate a high potential for scholarly achievement and research. Individuals possessing graduate degrees in fields other than education are encouraged to apply. Experience in teaching, research, or related areas of education are desirable.

## APPLYING FOR ADMISSION

School of Education graduate and teaching credential students are admitted for fall term ONLY. Online applications will be available through the Office of Graduate Studies website at <http://gradstudies.ucdavis.edu/>.

Application deadlines and requirements vary by program. Please consult with a School of Education adviser regarding your program interests. Applicants with underrepresented and nontraditional backgrounds are encouraged to apply.

### Minor in Education

**No Application Deadline.** The Education Minor is open to students in all majors.

For more information, see <http://education.ucdavis.edu> or contact the School of Education Student Services Office at 530-752-5887 or [eduadvising@ucdavis.edu](mailto:eduadvising@ucdavis.edu).

Steps in declaring a minor in education:

- Consult with the education undergraduate adviser in our Student Services Office
- Declare minor by completing a "Declaration of Minor" form at the MyUCDavis website

### Teaching Credential/M.A. Degree Program

**Application Deadline.** Please see the School of Education website for Program application information and deadlines at <http://education.ucdavis.edu>.

For more information or instructions please see our website or contact the School of Education Student Services Office at 530-752-5887 or [eduadvising@ucdavis.edu](mailto:eduadvising@ucdavis.edu).

Steps in the Admissions Process:

- Complete Office of Graduate Studies online application
- Submit nonrefundable application fee payable to UC Regents
- Upload official transcripts for all college and university work completed
- Submit to the School of Education any supporting documentation: verification of classroom field experience, copies of test scores, etc.

Applicants will be:

- Screened and scheduled for an admissions interview
- Evaluated and reviewed by an admissions committee
- Recommended to Office of Graduate Studies for admission or denial
- Notified of admission or non-admission by the Office of Graduate Studies

## M.A. Degree

### ***Master of Arts in Education General Track***

**Application Deadline.** Please see the School of Education website for Program application information and deadlines at <http://education.ucdavis.edu>.

For more information or instructions please see our website or contact the School of Education Student Services Office at 530-752-5887 or [eduadvising@ucdavis.edu](mailto:eduadvising@ucdavis.edu).

Steps in the Application Process:

- Complete Office of Graduate Studies online application, which includes three (3) uploaded letters of recommendation
- Submit nonrefundable application fee payable to UC Regents
- Upload official transcripts for all college and university work completed
- Submit to UC Davis your official scores (taken within the last five (5) years) for the Graduate Record Exam (GRE) General Test

### **Capital Area North Doctorate in Educational Leadership (CANDEL)**

**Application Deadline.** Please see the School of Education website at <http://education.ucdavis.edu>.

For more information, see the program website at <http://education.ucdavis.edu/candel-admissions> or contact the School of Education at 530-754-6664 or [candeledd@ucdavis.edu](mailto:candeledd@ucdavis.edu).

Steps in the application process:

- Complete the online application for the Capital Area North Doctorate in Educational Leadership

- Complete online UC Davis Office of Graduate Studies application
- Submit nonrefundable application fee payable to UC Regents
- Official score(s) for the Graduate Record Examination (GRE) General Test
- Three (3) letters of recommendation
- Upload one (1) official transcript from all institutions attended
- Writing sample (typically a seminar paper, thesis, or published article)
- Submit a statement of support from employer; a separate document from the applicant's current employer verifying a commitment to Friday's coursework

Finalists will be contacted to schedule an interview.

## Ph.D. Degree

**Application Deadline.** Please see the School of Education website at <http://education.ucdavis.edu>.

For more information or an application package, see the program website at <http://education.ucdavis.edu/phd-education> or contact the School of Education Student Services Office at 530-752-5887 or [phdeduadvising@ucdavis.edu](mailto:phdeduadvising@ucdavis.edu).

Steps in the application process:

- Complete online UC Davis Office of Graduate Studies application
- Submit nonrefundable application fee payable to UC Regents
- Official score(s) for the Graduate Record Examination (GRE) General Test
- Three (3) letters of recommendation
- Upload one (1) official transcript from all institutions attended
- Writing sample (typically a seminar paper, thesis, or published article)



SCHOOL OF LAW

## SCHOOL OF LAW

School of Law, Admission Office  
530-752-6477; [admissions@law.ucdavis.edu](mailto:admissions@law.ucdavis.edu), <http://www.law.ucdavis.edu>

The University of California Davis School of Law offers a three-year professional curriculum leading to the degree of Juris Doctor. Within a uniquely supportive atmosphere, law students have access to a comprehensive modern law school curriculum taught by a nationally and internationally distinguished faculty. The School offers a full range of traditional law courses, opportunities for practical experience through clinical programs, and in-depth study of an area of law in an individualized program of classroom work, research, writing, or experience in the community. It further provides professional skills training in interviewing and counseling, negotiation and dispute resolution and trial practice. The School seeks to promote critical evaluation of law and legal institutions in a broad perspective, integrating non-legal disciplines with professional legal education.

UC Davis Law School is fully accredited by the American Bar Association, is a member of the Association of American Law Schools, and has a chapter of the Order of the Coif.

## PREPARING FOR THE STUDY OF LAW

No specific college major is required for admission to the School of Law and there is no prescribed pre-legal program. Your college record and Law School Admission Test (LSAT) score must, of course, demonstrate that you are highly qualified for the study of law.

As a pre-law student, you should plan a course of study that will give you a broad cultural background and include intensive work for a substantial period of time in a selected field of study. Pre-law students should develop the ability to think critically. You should gain an understanding of people and institutions and know how to gather and weigh facts, to solve problems and think creatively. You should be able to read rapidly with comprehension and express thoughts clearly, completely, and concisely, both orally and in writing.

You can get help with program planning from the Pre-Law Advising Office in 160 South Silo 530-752-4475.

For additional information, see the Official Guide to ABA-Approved Law Schools, a publication of the Law School Admission Council and the American Bar Association. The guide includes information on the law and lawyers, pre-law preparation, applying to law school and the study of law, together with individualized information on all ABA approved law schools. The Official Guide is accessible at <https://officialguide.lsac.org>.

## APPLYING FOR ADMISSION

Deadline for filing electronic applications for admission to the School of Law:

### March 15

1. Request the law school catalog to learn more about the School and the admission process. The electronic application is available at the School's website, <http://www.law.ucdavis.edu> or at the Law School Admission Council (LSAC) website at <http://www.lsac.org/jd>. Complete instructions about the admission process, including answers to frequently asked questions, are available on the J.D. Admissions section of the Law School website.
2. You must take the Law School Admission Test (LSAT) and register with the Credential Assembly Service (CAS) so that the score will be reported to the school. You are urged to take the test as early as possible, and to take it no later than February of the year in which admission is sought; the June test date is too late for fall admission.

Testing centers are located in all parts of the United States and in many foreign countries. LSAC administers the test four times a year: February, June, September/October, and December

To obtain information about the test, specific test dates, and the location of testing centers, visit the Law School Admission Council (LSAC) website at <http://www.lsac.org/jd>. Both the CAS and LSAT registration process are electronic

3. Register with the Credential Assembly Service (CAS) no later than December 1 at the LSAC website. Arrange to have a transcript from each college or university you have attended sent directly to LSAC. Complete instructions for the online services are available at the LSAC website.
4. Submit an updated official transcript of college work completed during the first semester or quarter of your senior year directly to the School of Law as soon as it is available. Failure to do so may delay consideration of your application materials. Successful applicants must submit a final transcript showing the award of a bachelor's degree.
5. Provide two letters of recommendation from objective and responsible persons who know you well. At least one of these letters should come from a faculty member under whom you studied while in college. UC Davis School of Law requires all applicants to submit recommendations to the LSAC Letter of Recommendation Service (LOR) for inclusion with your CAS report.

Your application will be reviewed by the School of Law Admissions Committee, which seeks students of demonstrated academic ability, as evidenced by a variety of factors including information provided in the required two-four page personal statement, letters of recommendation, LSAT score, and the undergraduate grade point average (GPA). The Committee seeks students of diverse backgrounds and considers economic factors, obstacles overcome, advanced degrees or other advanced studies, significant work experience and extracurricular and community activities during and after the college years. An applicant's growth, maturity, and commitment to the study of law are also major considerations. Students are admitted only on a full-time basis and only for fall admission.

- 6.** When accepted by the School of Law, you are simultaneously admitted to Graduate Studies on the UC Davis campus of the university for the program leading to the degree of Juris Doctor. If you intend to pursue studies leading to other graduate degrees, or wish to become a candidate for a Combined Degree Program, you must make separate application to Graduate Studies or the Graduate School of Management before commencing such studies.

### **Admission to Advanced Standing**

If you have completed at least one year of full-time law course work in another American Bar Association (ABA) approved law school, you may be considered for admission to advanced standing with credit for not more than one year of such work. The application filing period is January 1-30. No application for advanced standing will be considered until the Office of Admissions has received transcripts for at least one semester of full-time course work in a three-year program.

Application procedures for advanced standing are the same as described above with the addition of (1) a letter of good standing, including class rank, from the dean of any law school previously attended; (2) at least one letter of recommendation from a law professor; (3) transcripts of all law school work; (4) LSAT score provided as part of an updated CAS report from LSAC; and (5) an official transcript from the school where you earned your undergraduate degree, stating the date the degree was conferred. The deadline for transfer applications is June 30 of the year for which transfer is sought. Those applicants who demonstrate high academic performance in the first semester of law school may be offered early admission. Those offered early admission must complete the first full year in the top one-third of the class or the School of Law reserves the right to reconsider its offer of admission. All other decisions are normally made in July or early August of the year in which admission is sought.

Students who have been disqualified at another law school will not be admitted to UC Davis Law School.

### **Recruitment of Underrepresented Groups**

The students and faculty of the School of Law recognize the great need for lawyers from under-represented groups. The School, therefore, actively solicits applications from those groups that reflect the many diverse populations of California but, traditionally, have been underrepresented in the law school population.

The School of Law, in cooperation with the Association of American Law Schools (AALS) and the Council on Legal Education Opportunity (CLEO), participates in programs designed to increase the number of law students from underrepresented groups. CLEO applications may be obtained by writing to Council on Legal Education Opportunity, 740 15th Street, N.W., 9th floor, Washington, D.C. 20005, 202-828-6100 or toll free 866-886-4343; <http://www.cleoscholars.com>.

### **PROGRAM OF STUDY**

The professional curriculum requires six semesters for completion and extends over a period of three years. It is for full-time students only; no part-time or evening program is offered. New students are admitted only at the beginning of the fall semester.

After satisfactorily completing the professional curriculum of 88 semester units and the required period of resident study, you will receive the degree of Juris Doctor (J.D.). Students who fail to attain satisfactory grades may be required to withdraw from the School at the end of any academic year.

The first year's work is prescribed and provides the essential foundation for subsequent legal study. Satisfactory completion of the first-year courses is, in all cases, prerequisite to second- and third-year courses. The work of the second and third years is elective. The courses of the professional curriculum are listed in the [Undergraduate Courses](#) chapter.

### **Combined Degree Programs**

Individual students may find a combined degree involving law and another discipline such as economics, business, sociology, or science advantageous. To support this kind of study, the School, in conjunction with other schools and university departments, has established Combined Degree Programs. Under these programs, a student may work toward a J.D. degree and a master's degree in another discipline at the same time. Students working toward a combined degree are required to spend their first year at the law school.

Normally, a Combined Degree Program will take at least four years. You will usually be able to earn up to 10 semester-hours of law school credit for work in the related discipline and normally can complete the combined degrees in less time than it would take to earn the two degrees separately. The first year of the Combined Degree Program must be taken entirely in the School of Law. During the remaining years, course work may be divided between the law school and the related discipline. You must satisfy the admission requirements for both programs and file applications with both units.

Students have pursued degree programs in combination with UC Davis departments for the M.A. degree in economics, philosophy, computer science, and sociology, and with the School of Management for the M.B.A. degree. The law school will attempt to work out an additional program if you are interested in other disciplines. You may enroll in the Combined Degree Program any time before the beginning of your third year in law school. If you are interested in pursuing a Combined Degree Program, and have made a separate application to another school or department, you should notify the School of Law if that application is accepted.

## The LL.M. Program

530-752-6081; Fax 530-757-8596; [internationallaw@ucdavis.edu](mailto:internationallaw@ucdavis.edu)  
<http://www.law.ucdavis.edu/international/>

The Law School LL.M. (Master of Laws) program integrates American and foreign law students at all levels of study. For foreign law graduates, the program provides an opportunity to gain a basic knowledge of the United States legal system. United States law school graduates and selected foreign LL.M. candidates may also seek admission on a thesis rather than a course basis. Other opportunities available to all graduate law students include developing special expertise in a particular area and doing special projects and original research under the direction of a faculty member.

Each LL.M. candidate must successfully complete a minimum of 20 semester units of work, usually 10 units each semester. Foreign LL.M. students must enroll in the 1-unit course *Introduction to Legal Research* and the 2-unit course *Introduction to the Law of the United States*. They earn the remainder of their required course credit in regular elective J.D. courses. Each foreign student must also complete an intellectually rigorous legal research and writing project, constituting at least two units of credit.

All LL.M. candidates begin their year of study with a complete orientation in the academic and social life of the law school, the UC Davis campus, and the city of Davis. LL.M. students are encouraged to enroll in the School of Law's Orientation in U.S.A. Law Program, given in the month before the LL.M. Program begins.

## SCHOOL OF LAW ACADEMIC CALENDAR 2016-2017

The School of Law operates on a semester system rather than the quarter system used on the remainder of the UC Davis campus.

	Fall 2016	Spring 2017
Introduction Week	Monday– Friday, Aug 15–19	
Law School instruction begins	Monday, Aug 22	Thursday, Jan 11
Labor Day holiday	Monday, Sep 5	
Veteran's Day holiday	Friday, Nov 11	
Thanksgiving holiday	Thursday– Friday, Nov 24–25	
Martin Luther King, Jr. holiday		Monday, Jan 16
Presidents' Day holiday		Monday, Feb 20
Spring recess		Monday– Friday, Mar 20–24
Cesar Chavez Day		Friday, March 31
Law School instruction ends	Thursday, Dec 1	Friday, Apr 28
Reading period	Friday– Sunday, Dec 2–4	Saturday– Tuesday, Apr 29–May 2
Law School examination period	Monday– Tuesday, Dec 5–20	Wednesday– Thursday, May 3–18
Law School Commencement		Friday, May 19
<i>Tuesday, November 8 is treated as a Friday for class schedule purposes.  Wednesday, November 23 is treated as a Friday for class schedule purposes.  Wednesday, January 18 is treated as a Monday for class schedule purposes.  Thursday, February 23 is treated as a Monday for class schedule purposes.</i>		
<a href="https://law.ucdavis.edu/registrar/academic-calendar.html">https://law.ucdavis.edu/registrar/academic-calendar.html</a>		



GRADUATE SCHOOL OF MANAGEMENT

## GRADUATE SCHOOL OF MANAGEMENT

Graduate School of Management  
Gallagher Hall  
530-752-7658; <http://gsm.ucdavis.edu>

The Graduate School of Management offers multiple program options in locations throughout northern California, leading to the MBA degree. The programs provide both entry-level and mid-career students with an understanding of management approaches to problem solving and an awareness of the environment within which public and private management decisions are made. Successful completion requires not only a sophisticated understanding of a variety of functional skills in finance, marketing, production, program evaluation and accounting, but also an understanding of leadership, information systems and the application of scientific methods to the identification and solution of management problems.

### PREPARING FOR THE STUDY OF MANAGEMENT

A bachelor's degree and a strong interest in professional management are prerequisites for admission to the Graduate School of Management. The program seeks students from diverse professional and academic backgrounds and does not limit its consideration to applicants from any particular category of majors. Entry-level and mid-career applicants are considered and women and minorities are encouraged to apply.

Although the program has no specific subject prerequisites, it is strongly recommended that students complete the following course work before enrolling:

- Accounting**—an introductory course in financial accounting
- Economics**—an introductory course in microeconomics
- Mathematics**—an introductory course in calculus
- Statistics**—a course in elementary statistics

### APPLYING FOR ADMISSION

**Application Deadlines** are in November, January, March and May, each year. Dates are subject to change.

For the most current information, see <http://gsm.ucdavis.edu>.

Admission is for the fall quarter only. Application materials can be obtained in the following ways:

- Apply at <http://gsm.ucdavis.edu>
- Print the application materials at <http://gsm.ucdavis.edu> or contact the Admissions office at [admissions@gsm.ucdavis.edu](mailto:admissions@gsm.ucdavis.edu)
- Contact admissions staff at 530-752-7658

Complete and return your application, with all supporting documents, by the deadlines given above. The application fee is \$125.00.

In addition to the formal application, applicants must submit:

- Transcripts from all colleges or universities previously attended
- Graduate Management Admission Test (GMAT) or Graduate Record Exam (GRE) taken within the last five years of the admission date. For further information and registration forms, contact Graduate Management Admission Council at <http://mba.com> or Educational Testing Service at <http://ets.org/gre>

- Two letters of recommendation
- Two essays on specific topics
- Interviews are by invitation only

For more information, call 530-752-7658, or contact [admissions@gsm.ucdavis.edu](mailto:admissions@gsm.ucdavis.edu).

### International Students

International applicants for whom English is a second language must take either Test of English as a Foreign Language (TOEFL) or IELTS within the last two years. For more information, contact TOEFL, Educational Testing Service at <http://toefl.org> or IELTS International at <http://ielts.org>.

International students must show proof of financial support for two academic years including fees and living expenses.

### Criteria for Admission

Admission to the UC Davis MBA Program is highly selective. The aim of the Admissions Committee is to select those applicants whose academic background, intellectual capability, work experience, demonstrated leadership and communication skills meet the challenging demands of the MBA program and a managerial career. Consideration of an applicant's undergraduate performance includes a review of trends in scholastic performance and areas of academic strength as well as an assessment of overall grade point average. Admissions standards and grading policies of the schools attended are also considered. Verbal, quantitative and analytical scores on the GMAT are used to evaluate general aptitude for management study. Background and maturity as indicated by employment history, service and activity records, recommendations and the applicant's essays, and interviews are factors in the committee's evaluation. Professional management experience is not required for admission but is favorably considered.

### PROGRAM OF STUDY

The UC Davis MBA program prepares innovative leaders for global management. Students are required to take ten core courses (equaling 30 units of study), and 42 units of elective coursework for the 72 units required for the degree. The required core curriculum is designed to provide students with a foundation in the functional areas of business—accounting, economics, finance, marketing, organizational behavior, statistics, and strategy. These management disciplines are examined through the use of case studies, lectures and the analysis of a few select companies on which to base illustrations and spark discussions. All students must also complete a course in business speaking and writing, and a capstone project course that integrates knowledge from the core courses. The capstone project requires students to complete a sophisticated consulting project with a corporate client. Professional level analysis and recommendations are expected as outputs.

Elective courses at the Graduate School of Management place an emphasis on real-world application of management principles through the use of executive guest speakers who present "live" case study analyses and actual "client" businesses for student projects. Many courses require team projects and emphasize managing by innovation and entrepreneurship. These team projects develop your independent research abilities and hone your presentation skills.

Most students choose functional concentrations such as:

- Business Analytics and Technologies
- Entrepreneurship
- Finance/Accounting
- General Management
- Marketing
- Organizational Behavior
- Strategy

## Part-Time MBA Programs in Sacramento and Bay Area

In addition to the full-time program on the UC Davis campus, the Graduate School of Management offers two part-time MBA programs in Sacramento and in the Bay Area. These programs offer the same courses taught by the same instructors as in the full-time program, and have the same requirements for graduation as does the full-time program. Students enrolled in the MBA Program pay a flat rate per unit.

Information about fees is available at <http://gsm.ucdavis.edu>.

**Application deadlines** are in November, January, March, May and June each year. Dates are subject to change. For the most current information, see <http://gsm.ucdavis.edu>.

If you would like more information about this program, please contact the Graduate School of Management Admissions at 530-752-7658 or see <http://gsm.ucdavis.edu>.

## Master of Professional Accountancy (MPAc)

The Master of Professional Accountancy (MPAc) degree is a full-time, one-year program designed to prepare students for a career in the accounting field, and to fulfill the requirements for those seeking to take the Uniform Certified Public Accountant Exam as administered by the State of California. The MPAc degree provides students with the skills to be experts in risk assessment, systems analysis, taxation, and corporate governance, and to act as overseers of public trust.

Graduates will gain a breadth of communication, business, and accounting skills that will meet the demands of sought-after organizational leadership roles.

### Preparing for the Master of Professional Accountancy

An undergraduate degree in accounting is not a prerequisite for the MPAc program. However in order to prepare for the rigorous curriculum at the graduate level, students are required to complete the following three courses:

**Introduction to Financial Accounting.** Basic concepts of accounting; interpreting and using financial statements; understanding accounting principles

**Introduction to Managerial Accounting.** Product costing; using accounting information for decision making; planning

and performance evaluation

**Business Law.** General principles of business law in the areas of contracts, business organization, real property, uniform commercial code, sales, commercial paper, employment relations, and creditor-debtor against a background of the history and functioning of our present legal system

Students are expected to complete prerequisites before beginning the MPAc program; any deficiencies must be completed prior to enrollment. Transfer credits from other institutions cannot be substituted for the MPAc curriculum, although such classes can be used to fulfill the aforementioned prerequisites.

The MPAc program welcomes applicants from all undergraduate disciplines and backgrounds. Women and minorities are encouraged to apply.

### Applying For Admission

Application deadlines for the Masters of Professional Accountancy are in December, February, March and June, each year. For current information, see <http://gsm.ucdavis.edu/master-professional-accountancy>.

To obtain application materials or apply online, see <http://gsm.ucdavis.edu/mpac-admissions>. Applicants are required to submit:

- Transcripts from all colleges or universities attended
- Scores from either the Graduate Management Admission Test (GMAT) or the Graduate Record Examination (GRE) taken within the last five years
- Two letters of recommendation
- International students who have not earned an undergraduate degree in an English-speaking institution must take the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS) exam. For more information, see <http://toefl.org>, <http://pearsonpte.com>, or <http://ielts.org>
- International students must demonstrate proof of financial support for one academic year, including fees and living expenses.

Interviews are by invitation only.

### Admission Criteria

The goal of the Admissions Committee is to select those applicants whose academic background, intellectual capability, communication skills, and professional promise meet the demands of the MPAc program.

Consideration of an applicant's undergraduate performance includes a review of trends in scholastic performance and areas of strength as well as an assessment of overall grade point averages. Admissions standards and grading policies of the schools attended are also considered. Verbal, quantitative and analytical scores on the GMAT or GRE are used to evaluate general aptitude for the MPAc course of study. Recommendations and the applicant's essays are factors in the committee's evaluation.

**Program of Study**

The MPAc program is “lock-step” meaning there are no electives and students complete courses as a unified cohort. The curriculum, which begins in the fall quarter and finishes the following spring quarter, is designed to establish a foundation in financial reporting and analysis, financial management, taxation and tax

analysis, auditing and attestation, professional communication, managerial controls, and accounting ethics.

Students must pass a capstone examination at the end of coursework at the culmination of spring quarter to receive the degree.

For more information, call the Graduate School of Management at 530-752-7658, or see <http://gsm.ucdavis.edu/master-professional-accountancy>.



SCHOOL OF MEDICINE

## SCHOOL OF MEDICINE

School of Medicine  
<http://www.ucdmc.ucdavis.edu/medschool/>

The Doctor of Medicine degree requires the satisfactory completion of a four-year course of study composed of 15 consecutive quarters. Course work is conducted on the Sacramento campus, at the UC Davis Medical Center and in nearby affiliated hospitals.

### PREPARING FOR THE STUDY OF MEDICINE

When you apply to the School of Medicine, you must submit the results from the Medical College Admission Test (MCAT), so it is recommended that you take the MCAT by the spring before application. Information can be obtained at your undergraduate institution or directly from MCAT Program, Box 4056, Iowa City, IA 52243; 319-337-1357. To be acceptable for the fall entering class, the MCAT must be taken no later than the previous fall. No scores older than three years from June of the year you apply will be accepted. Applicants must also meet the following academic requirements.

**A.** Completed at least three years of study in an accredited college or university in the United States. A minimum of 90 semester hours or 135 quarter units of college-level work is required. Courses in highly specialized fields are acceptable only at the discretion of the medical school.

**B.** Physicians should have a broad college level education in the natural, social, and behavioral sciences and the humanities. We require the MCAT and three years (90 semester hours or 135 quarter hours) in an accredited college or university that include the specific requirements listed below.

**C.** Required college-level courses (verified by AMCAS):

- Biological Sciences: 1 year
- Chemistry, general and organic sequence: 2 years
- Physics: 1 year

Technical, Non-Academic Standards are also required. For more information, see <http://www.ucdmc.ucdavis.edu/mdprogram/admissions/requirements.html>.

For additional information, contact the School of Medicine Admissions Office at 916-734-4800.

### ADMISSIONS PROCESS

The UC Davis School of Medicine admissions cycle starts in July and ends the following July. Upon applying through AMCAS, you receive information on how to enter and use the Applicant Portal. All communications and updates related to your application are managed through the Applicant Portal. For your convenience, please communicate through the Message Center, which is checked regularly. The UCDSOM admissions process consists of four major steps:

#### STEP 1: Complete your AMCAS Application

June 1 is the first day students may submit applications to the American Medical College Application Service. It is a good idea to

submit your AMCAS application no later than August 1. October 1 is our deadline to submit all application materials to AMCAS. Extensions will not be considered.

#### STEP 2: Secondary Application (by invitation only)

After applying, your application is reviewed and qualified applicants are invited to complete our UC Davis School of Medicine secondary application. The secondary application consists of:

- Supplementary activities and essays including possible interest in special Programs in Medical Education (PRIME) tracks and research pathways
- Letters of recommendation (3-6 LORs allowed)
- Complete pre-requisite information
- Non-refundable application fee: \$90

Completed secondary applications are forwarded to the admissions committee who perform a holistic review of applications and invite select applicants for an interview. Interview invitations are on a rolling basis-July through January.

#### STEP 3: Interview Day (by invitation only)

Our interviews are always held on Fridays starting in mid-August and ending in February/March.

#### STEP 4: Acceptance Decision

Upon completion of your interview, your application is forwarded to Admissions Committee. Acceptance decisions are made on a rolling basis starting on October 15 through July 15 the following year. Decisions are made within 30-45 days post-interview after review of your entire application packet. Categories of decision are:

- Acceptance: Starting October 15 and through July 15
- Wait list: Applicant informed of wait list status with final decision starting April 30 through July 15
- Not Accepted

### ADMISSIONS CRITERIA

The UC Davis School of Medicine Admissions Committee reviews each applicant's experiences, attributes, and metrics as related to our core student physician competencies:

- Patient care
- Knowledge
- Interpersonal and communications skills
- Professionalism
- System-based practice (working within the health care system to enhance care)
- Life-long learning

The Admissions Committee determines whether the applicant will be granted a secondary application, interview, and ultimately acceptance to the UC Davis School of Medicine. Committee members attempt to do a holistic assessment of each applicant that includes, but is not limited to, the following experiences, attributes, and metrics (in no particular order of importance):

## Experiences

- Healthcare experience
- Research experience
- Leadership experience
- Community service
- Educational background
- Experience working in inter-professional teams
- Life experiences (e.g. obstacles overcome)

## Attributes

- Geographic origin (e.g. rural or medically underserved area)
- Resilience
- Motivation for a medical career
- Intellectual curiosity
- Communication skills, including listening and empathy
- Languages spoken, particularly by underserved patient populations
- Critical thinking skills including problem solving
- Professional responsibility and accountability
- Values and ethical beliefs
- Self-assessment and improvement skills
- Altruism and compassion
- Appreciation for diverse perspectives
- Ability to work in inter-professional teams
- Honesty and integrity

## Metrics

- Undergraduate grades, grade trends, and course load
- Medical College Admissions Test (MCAT) score
- Performance in a post-baccalaureate and/or graduate degree program

Western Interstate Commission for Higher Education (WICHE) and residents of participating states will be considered as residents for the purposes of admission. For more information submit inquiries to WICHE at <http://wiche.edu/askWICHE/submit> or call 303-541-0200.

## Transfer with Advanced Standing

We do not accept transfer students.

## PROGRAM OF STUDY

**Doctor of Medicine.** The curriculum for the M.D. degree is normally a four-year program that provides comprehensive training for the practice of medicine and provides a blend of basic sciences training and clinical experience. The emphasis during the first two years is on the basic-science foundations of medicine. Medical students are introduced to patient care during their very first quarter of study, reflecting the school's commitment to the training of highly skilled clinicians. Several volunteer clinics, largely staffed by UC Davis medical students, provide an ideal setting for hands-on clinical experience.

**Tailored Clinical Tracks.** We offer tailored clinical training for students interested in providing care for rural communities, urban underserved communities, and communities in the San Joaquin

Valley. Our newest track, offered in collaboration with Kaiser Permanente Northern California, is a three-year pathway through medical school for students committed to Primary Care careers.

**Combined Degree Program.** In addition to the Doctor of Medicine degree, the School of Medicine at UC Davis offers a variety of dual-degree programs through coordination with other graduate groups and divisions. These advanced degrees can couple the M.D. degree with the M.P.H., Ph.D., and M.B.A. that train physicians to meet, respond to and solve the broad diversity of problems and dilemmas facing current and future health care.

Meeting this challenge requires those capable of advancing our biological sciences knowledge base and others who can recognize and solve the ethical, political and humanitarian issues that confront the broad delivery of health care to all. Hence, the field for the Ph.D. in the joint degree program at UC Davis can be any graduate program offered on the UC Davis campus, extending beyond the traditional biological sciences boundaries, and strongly encouraging candidates to seek degrees in social sciences and humanities. All requirements for both degrees are met in a course of study that usually lasts seven years. To be admitted, and be concurrently enrolled in both degree programs, students must apply for separate admission to both the M.D. and Ph.D. programs and obtain permission of the School of Medicine M.D./Ph.D. Advisory Committee. Funding for two competitive fellowships is awarded annually to students enrolled in the M.D./Ph.D. program.

**Advisory Committee.** Inquiries about admission to graduate education should be directed to the Dean of Graduate Studies, University of California, One Shields Avenue, Davis, CA 95616. For more information concerning the combined-degree programs, contact Joanna Garcia, Office of Admissions, School of Medicine, University of California, 4610 X Street, Sacramento, CA 95817.

**Master of Public Health (MPH) Degree.** The Department of Public Health Sciences (PHS) offers the MPH degree. The MPH degree is accredited by the Council on Education for Public Health. Students apply for admission through the Office of Graduate Studies. The MPH program is designed for people interested in disease prevention and community health. The program includes instruction in epidemiology, biostatistics, environmental and occupational health, health services and administration, and social and behavioral science, and prepares students for an expanding range of professional opportunities and roles in public health and medicine. The MPH program runs on the main campus quarter system. The majority of courses are taught on the Davis campus. For more information, see <http://mph.ucdavis.edu/>. For course information, see Master of Public Health (MPH), on page 442.

## ACADEMIC CALENDAR

The School of Medicine operates on a different schedule from the rest of the UC Davis campus. The program is a continuous four-year academic experience. The first year curriculum commences in mid-summer and extends through mid-spring of the following year. There is a five week break between the first and second year for electives, research, and remediation. The second year curriculum begins in early summer and extends through mid-spring of the following year. This is followed by a six-week academic period for preparation for USMLE Step 1. The third year clinical clerkships start in the spring and extend for 48 weeks. The fourth year curriculum begins immediately thereafter and extends through spring of the following year, with graduation in May.



BETTY IRENE MOORE SCHOOL OF NURSING

## BETTY IRENE MOORE SCHOOL OF NURSING AT UC DAVIS

Education Building, Sacramento campus  
UC Davis Health System  
916-734-2145; <http://nursing.ucdavis.edu>

The Betty Irene Moore School of Nursing at UC Davis advances health and ignites leadership through innovative education, transformative research and bold system change.

The school cultivates academic excellence through immersive, interprofessional and interdisciplinary education and research in partnerships with the communities it serves. Faculty, staff and students discover and disseminate knowledge to advance health, improve quality of care and shape policy.

The school was launched through a \$100 million commitment from the Gordon and Betty Moore Foundation, the nation's largest grant for nursing education. The Betty Irene Moore School of Nursing cultivates academic excellence and addresses urgent societal needs through:

- Leadership development—build capacity for advocacy and action at all levels
- Interprofessional/interdisciplinary education—health professionals learn multiple perspectives to work and communicate as teams
- Transformative research—apply the science of nursing to improve health and reshape health systems with emphasis on aging, rural health and diverse communities
- Cultural inclusiveness—teach culturally-appropriate approaches to care and involve communities to design and conduct relevant research
- Innovative technology—use technology to create an engaged and interactive approach to nursing education, research and practice

Through the Nursing Science and Health-Care Leadership Graduate Degree Program, the school welcomed its first classes for the Master of Science—Leadership and the Doctor of Philosophy degree programs in fall 2010, for the Master of Science—Nurse Practitioner and Master of Health Services—Physician Assistant Studies degree programs in summer 2013, and welcomes the first class of the Master's Entry Program in Nursing in summer 2016.

Graduates of the Nursing Science and Health-Care Leadership Graduate Degree Program are prepared for academic and leadership positions. Graduates exercise leadership through scientific thinking, responsibility, initiative, cultural inclusiveness, knowledge of organizations and system change, teamwork and a commitment to healthy communities.

The Betty Irene Moore School of Nursing is part of UC Davis Health System, an integrated, academic health system encompassing the UC Davis School of Medicine, the 619-bed-acute-care teaching hospital and clinical services of UC Davis Medical Center and the 1,000-member physician group known as UC Davis Medical Group. For more information, see <http://nursing.ucdavis.edu>.

## PROGRAMS OF STUDY

### Nursing Science and Health-Care Leadership

The UC Davis Nursing Science and Health-Care Leadership Graduate Degree Programs prepare nurse leaders, physician assistants, researchers and faculty in a unique interdisciplinary and interprofessional environment. The graduate group is composed of faculty from across campus with expertise in nursing, medicine, health informatics, nutrition, biostatistics, public health and other fields.

### Doctor of Philosophy

Students with experience or interest in leading the transformation of health care through nursing education and research are sought for the Nursing Science and Health-Care Leadership Doctor of Philosophy program. Ideal students want to focus on important societal health issues through the work of advancing health and improving the systems that provide health services.

Graduates of the Betty Irene Moore School of Nursing are prime candidates for formal leadership positions. Graduates exercise leadership through scientific approaches, vision, initiative, cultural inclusiveness, teamwork, and a commitment to assuring health care is highly effective, compassionate and accessible.

The full-time, academic doctoral program prepares graduates as leaders in health care, health policy and also education and research at the university level to:

- Conduct transformative research
- Educate health professionals and researchers
- Effect system change
- Influence and implement policy
- Advance health from multiple settings

### Master of Health Services—Physician Assistant Studies

The Master of Health Services—Physician Assistant Studies Degree Program prepares graduates to deliver care as physician assistants. In alignment with the school's vision to advance health, a primary goal of the physician assistant program is to improve the availability of culturally relevant primary care to underserved populations and educate clinicians to deliver care as a member of a health-care team.

Physician assistants are health care professionals licensed to practice medicine with physician supervision. As part of their comprehensive responsibilities, physician assistants conduct physical exams, diagnose and treat illnesses, order and interpret tests, counsel on preventive health care, assist in surgery and write prescriptions.

Within the physician-physician assistant relationship, the physician assistant exercises autonomy in medical decision making and provides a broad range of diagnostic and therapeutic services.

A physician assistant's practice may also include education, research and administrative services.

The Master of Health Services—Physician Assistant Studies Degree Program graduates are prepared to work as leaders of health care teams and learn methods to continually critique and improve their care, provide care that is evidence-based and to establish systems

of care to address population health. All students must take core academic courses and complete a comprehensive exam as well as 1,530 hours of supervised clinical practice.

### **Master of Science—Leadership**

Ideal students for the Nursing Science and Health-Care Leadership Master of Science—Leadership Track are those with experience or interest in transforming health care through nursing education and research. They want to focus on important societal health issues through the work of advancing health and improving the systems that provide health services.

Graduates of this program are prepared for academic and leadership positions. Graduates exercise leadership through scientific thinking, responsibility, initiative, cultural inclusiveness, knowledge of organizations and system change, teamwork and a commitment to healthy communities.

The M.S.—Leadership program is a full-time, professional degree program that prepares graduates for health care leadership roles in a variety of organizations and as nurse faculty at the community college level.

Some examples include:

- Leaders of health organizations and agencies—such as community clinics, trade associations, advocacy groups—improving quality of care and work environments and advancing outcomes as well as health care effectiveness and efficiency
- Community college and other prelicensure nursing faculty—teaching the next generation of nurses
- Legislative and governmental agency staff and leadership developing, influencing and implementing policy to improve access and outcomes (not limited to health agencies but other organizations that provide public infrastructure such as transportation, planning or parks and recreation)
- Careers across the health care sector, such as insurance, pharmaceutical, hospital, home health, aging support services, adoption services, chronic illness support services and medical equipment industries fostering the integration of excellence in clinical care, management, policy, education and research

### **Master of Science—Nurse Practitioner**

The Master of Science—Nurse Practitioner Degree Program prepares graduates to deliver care as family nurse practitioners. In alignment with the school's vision to advance health, a primary goal of the family nurse practitioner program is to improve the availability of culturally relevant primary care to underserved populations and educate clinicians to deliver care as a member of a health care team.

Family nurse practitioners are registered nurses who are prepared, through advanced education and clinical training, to provide a wide range of preventive and acute health care services to individuals of all ages. Family nurse practitioners complete graduate-level education that leads to a master's degree.

Family nurse practitioners complete health histories and provide complete physical examinations, diagnose and treat many common acute and chronic problems, interpret laboratory results and X-rays, prescribe and manage medications and other therapies, provide health teaching and supportive counseling with an

emphasis on prevention of illness and health maintenance, and refer patients to other health professionals as needed.

The Master of Science—Nurse Practitioner program prepares graduates to work as leaders of health-care teams and learn methods to continually critique and improve their care, provide care that is evidence-based, and to establish systems of care to address population health. All students must take core academic courses and complete a comprehensive exam as well as 720 hours of supervised clinical practice.

### **Master's Entry Program in Nursing**

The Master's Entry Program in Nursing prepares new nurses as leaders in quality and safety, advocates for diverse patient populations and agents of change for healthier communities. Graduates of the program are qualified to take the national licensing examination (NCLEX) for registered nurses, eligible for certification as a Public Health Nurse and earn a Master of Science in Nursing Degree.

Also known as an accelerated program, this master's degree program offers the quickest route to registered nursing licensure for adults who already completed an undergraduate degree in another discipline and also completed prerequisite courses to transition into the nursing profession.

Guided by the School of Nursing's core values of leadership development, interprofessional and interdisciplinary education, transformative research, cultural inclusiveness and innovative technology, the entry-level master's-degree program takes 18 months (six consecutive quarters including summers) to complete. Core courses are offered summer, fall, winter and spring quarters. Students are typically in class Monday through Friday and should expect that some quarters they may complete clinical experiences during nights and weekends.

### **Master of Science—Nurse Practitioner and Physician Assistant Dual-Track Program**

Family nurse practitioner students at the Betty Irene Moore School of Nursing may apply to simultaneously prepare for both the nurse practitioner and physician assistant professions through the unique Master of Science—Nurse Practitioner and Physician Assistant Dual-Track Program.

This dual-track program is the only one in the nation where nurses are prepared to work as both family nurse practitioners and physician assistants.

Students who wish to enroll in this track must first be accepted into the M.S.—Nurse Practitioner program. Once accepted, students may apply during their first quarter for the dual-track programs.

Students in the dual-track program must complete additional coursework and supervised clinical hours to meet both the family nurse practitioner and physician assistant education requirements. The dual-track program is nine quarters in length. Upon completion of the dual-track program, a graduate earns a Master of Science—Nurse Practitioner Track Degree in Nursing Science and Health Care Leadership as well as a certificate in physician assistant studies. Dual-track students are then eligible to complete the family nurse practitioner certification exam and the physician assistant licensing exam.

## PREPARING FOR THE STUDY OF NURSING

The Nursing Science and Health Care Leadership Graduate Degree Program is ideal for students who:

- See problems in health care and think of solutions
- Want to improve health systems and advance health
- Find value in diversity of thought, belief, language and culture

## APPLYING FOR ADMISSION

Betty Irene Moore School of Nursing students are admitted during fall term only for the Master of Science—Leadership and Doctor of Philosophy programs and summer term only for the Master of Science—Nurse Practitioner program, Master of Health Services—Physician Assistant Studies program and Master's Entry Program in Nursing. Students applying for the physician assistant program must complete a Centralized Application System for Physician Assistants (CASPA) application and meet selection criteria. Students applying for the nurse practitioner program must complete a Nursing Centralized Application Service (NursingCAS) application and meet selection criteria. Following that process, a select pool of qualified applicants is invited to apply for UC Davis graduate admissions. All invited applicants must meet UC Davis graduate admissions requirements. Online applications are available through the Office of Graduate Studies website at <http://gradstudies.ucdavis.edu>.

Application deadlines and requirements vary by program and year. For more information, please see the School of Nursing website at <http://nursing.ucdavis.edu> or contact the School of Nursing at 916-734-2145.

## DOCTOR OF PHILOSOPHY

### Admission Requirements

- A bachelor's degree in nursing or a related field
- A minimum bachelor's-degree G.P.A. of 3.000
- Three (3) letters of recommendation
- A statement of purpose, personal history, research professional history and future goals
- The application process may require an interview
- The G.R.E. is not required

### Degree Program Requirements

Required courses for the doctoral program include a combination of core courses and electives. Students work with their advisers to select electives appropriate to their areas of interest.

- Full-time enrollment (12 units per quarter) is required.
- Required courses for the doctoral-degree program include a combination of core and elective courses. A series of courses in research methods is also required.
- Doctoral students are required to pass an oral qualifying examination. The intent of the oral qualifying examination is to determine whether the student is adequately prepared and sufficiently intellectually independent to conduct doctoral-level research. The exam may include both an oral component as well as the student's proposal for the dissertation research.
- A doctoral dissertation is required. Students will enroll in disser-

tation units as full-time students after the qualifying exam until the dissertation is complete.

- Ph.D. students are expected to complete the program in four years.

## MASTER OF HEALTH SERVICES—PHYSICIAN ASSISTANT STUDIES DEGREE PROGRAM

### Admission Requirements

- A bachelor's degree
- A minimum undergraduate G.P.A. of 3.000
- A minimum 2.700 G.P.A. in all science prerequisite coursework
- A minimum of 1,000 hours of paid or volunteer experience in a clinical environment with direct patient exposure
- Statement of purpose, personal history and research professional history
- The application process may require an interview
- G.R.E. is not required
- TOEFL (international applications only)
- Three (3) letters of recommendation

Official transcripts from each institution attended (submitted online through CASPA website).

### Degree Program Requirements

- Full-time enrollment (12 units per quarter) is required.
- Required courses for the master's degree program include a combination of core courses and electives. Six graduate-level core courses—Health Status and Care Systems, Implementation Science, Leadership in Health Care, Quantitative Skills for Change, Community Connections and an Informatics course—and the Master's Degree Seminar are required courses for the master's-degree program.
- A comprehensive exam is required.
- Physician assistant students are expected to complete the program in 27 months.

## MASTER OF SERVICES—LEADERSHIP DEGREE PROGRAM

### Admission Requirements

- Current registered nurse (R.N.) licensure
- A bachelor's degree
- A minimum undergraduate G.P.A. of 3.000
- A statement of purpose, personal-history, research professional history and future goals
- Three (3) letters of recommendation
- The application process may require an interview
- G.R.E. is not required

### Degree Program Requirements

- Full-time enrollment (12 units per quarter) is required.
- Required courses for the master's-degree leadership program include a combination of core courses and electives. Six gradu-

ate-level core courses—Health Status and Care Systems, Implementation Science, Leadership in Health Care, Quantitative Skills for Change, Community Connections and an Informatics course—and the Master's Degree Seminar are required courses for the master's-degree program.

- Students work with their advisers to select electives appropriate to their areas of interest.
- A master's thesis is required.
- M.S.—Leadership Track students are expected to complete the program in five quarters. A sixth quarter option is available if needed.

## **MASTER OF SERVICES—NURSE PRACTITIONER TRACK DEGREE PROGRAM**

### **Admission Requirements**

- Current registered nurse (R.N.) licensure
- A bachelor's degree
- A minimum undergraduate G.P.A. of 3.000
- A minimum 2.700 G.P.A. in all science prerequisite coursework
- A statement of purpose, personal-history, and research professional history
- The application process may require an interview
- TOEFL (international applicants only)
- Three (3) letters of recommendation
- Official transcripts from each institution attended (submitted on-line through CASPA website)
- G.R.E. is not required

### **Degree Program Requirements**

- Full-time enrollment (12 units per quarter) is required.
- Required courses for the master's-degree program include a combination of core courses and electives.
- A comprehensive exam is required.
- Nurse practitioner track students are expected to complete the program in 24 months.

## **MASTER OF SCIENCE IN NURSING: MASTER'S ENTRY PROGRAM IN NURSING**

### **Admission Requirements**

- A bachelor's degree
- A minimum bachelor's-degree G.P.A. of 3.000
- Three (3) letters of recommendation
- A minimum 2.7 G.P.A. in all science prerequisite coursework
- Statement of purpose, personal-history statement and future goals
- The application process may require an interview
- The G.R.E. is not required

### **Degree Program Requirements**

- Full-time enrollment (13-16 units per quarter) is required.
- A final capstone portfolio project and a comprehensive final exam are required; no thesis is required.
- M.S.N. students are expected to complete the program in six (6) quarters.
- Students in the Master's Entry Program in Nursing are required to follow the standard curriculum for a total of 92 units. Required courses include 33 units of graduate core courses plus 27 units of clinical and 32 units of theory courses required by the California Board of Registered Nursing (BRN). There are no electives in the requirements. Students must enroll full-time for the required number of units per quarter for six (6) consecutive quarters including academic, clinical, lab and seminar units. All core courses must be completed for a letter grade.

## **MASTER OF SCIENCE—NURSE PRACTITIONER AND PHYSICIAN ASSISTANT DUAL-TRACK PROGRAM**

Nurse practitioner students at the Betty Irene Moore School of Nursing can simultaneously prepare for both the nurse practitioner and physician assistant professions through the unique Master of Science—Nurse Practitioner and Physician Assistant Dual-Track program. This dual-track program is the only one in the nation where nurses are prepared to work as both nurse practitioners and physician assistants.

Students who wish to enroll in this track must first be accepted into the M.S.—Nurse Practitioner Program. Once accepted, the student works in conjunction with his or her adviser to determine dual-track eligibility. Students in the dual-track program must complete additional coursework and supervised clinical hours to meet both the nurse practitioner and physician assistant education requirements.

### **ACADEMIC CALENDAR**

The School of Nursing operates on the traditional UC Davis campus quarter system. The Doctor of Philosophy program is a four-year academic program and requires full-time enrollment. Core courses are offered fall, winter and spring quarters (not summer).

The Master of Health Services—Physician Assistant Studies Degree Program is a full-time, 27-month program. Core courses are offered summer, fall, winter and spring quarters.

The Master of Science—Leadership Degree Program is a full-time, professional degree five-quarter program. Core nursing courses are offered in fall, winter and spring quarters only (not summer).

The Master of Science—Nurse Practitioner Degree Program is a full-time, 24-month program. Core courses are offered summer, fall, winter and spring quarters.

The Master's Entry Program in Nursing Degree Program is a full-time, 18-month program. Core courses are offered summer, fall, winter and spring quarters.



SCHOOL OF VETERINARY MEDICINE

## SCHOOL OF VETERINARY MEDICINE

School of Veterinary Medicine  
Office of the Dean  
Dean's Suite, Veterinary Medicine Student Services and Administration  
Center, 944 Garrod Drive  
530-752-1360; <http://vetmed.ucdavis.edu>

The mission of the School of Veterinary Medicine is to advance the health of animals, people and the environment.

To carry out this mission, we focus on students of our professional Doctor of Veterinary Medicine program, Master of Preventive Veterinary Medicine program, graduate clinical residency program and graduate academic MS and PhD programs. The School of Veterinary Medicine serves the people of California by providing educational, research, clinical service, and public service programs of the highest quality to advance the health and care of animals, the health of the environment, and public health, and to contribute to the economy.

We address the health of all animals, including livestock, poultry, companion animals, captive and free-ranging wildlife, exotic animals, birds, aquatic mammals and fish, and animals used in biological and medical research. Our expertise also encompasses related human health concerns.

Our statewide mission includes 28 research and clinical programs, including clinical referral services; diagnostic testing services; continuing education; extension; and community outreach.



## PROGRAMS AND COURSES

## UNDERGRADUATE COURSES

### Lower Division Courses

These courses, numbered 1–99, are open to all students for lower division credit, but are designed primarily for freshmen and sophomores.

### Upper Division Courses

These courses, numbered 100–199, are open to all students who have met the necessary prerequisites as indicated in the *General Catalog* course description. Preparation should generally include completion of one lower division course in the given subject or completion of two years of college work.

## VARIABLE-UNIT COURSES

Subject to approval by the department chair, an instructor may arrange to give a special study course (numbers 90X, 92, 97T, 97TC, 98, 99, 190X, 192, 194H, 197T, 197TC, 198, 199) to interested students. These courses may be offered any fall, winter, or spring quarter as determined by the department.

- **90X/190X (Seminar)** are seminar courses for in-depth examination of a special topic within the subject area.
- **92/192 (Internship)** courses enable individual students to obtain practical experience to complement their educational goals or to explore potential career interests and opportunities. Students must have completed 84 units before enrolling in course 192.
- **97T/197T (Tutoring) and 97TC/197TC (Tutoring in the Community)** are courses for students who want to tutor in a subject in which they are proficient—generally in their major field—while enrolled as an undergraduate.
- **98/198 (Directed Group Study)** courses are set up on a one-time basis for a group of students in a subject for which no regular courses have been established.
- **99 (Special Study for Undergraduates)** is a course arranged for an individual student who shares, with an instructor, an academic interest that cannot be accommodated within the formal course structure.
- **194H (Special Study for Honors Students)** courses are for individual students with honor status, as determined by the department offering the course and who have completed 84 units.
- **199 (Special Study for Advanced Undergraduates)** courses are the upper division counterparts of course 99 and involve supervised independent study and research requiring adequate background in the subject proposed for study as well as prior completion of 84 units.

Credit in courses 99, 194H and 199 is limited to a total of 5 units per term.

**Autotutorial Courses** are courses in which students instruct themselves at their own pace. These courses can be identified by the letters AT at the end of their course numbers, e.g., 13AT, 141AT.

**Online & Hybrid Courses** are courses in which instruction is delivered on the Internet. Courses that are delivered:

- Completely online can be identified by the letter V at the end of their course numbers, e.g., 10V, 162V.
- As a combination of online and classroom can be identified by the letter Y at the end of their course numbers, e.g., 10Y, 162Y.

**Research Conference Courses** are courses in which advanced undergraduate students may participate in critical discussions of staff research activities. These one-unit courses are numbered 190C and are graded on a Passed/Not Passed basis.

## GRADUATE COURSES

Courses numbered 200–299 are open to graduate students and to undergraduates who have completed 18 units of upper division work basic to the subject matter of the course. However, admission is subject to the approval of the instructor in charge of the course. Grading in 290C courses and most variable-unit 299 or 299D courses is Satisfactory/Unsatisfactory. Check the course description for grading information.

## PROFESSIONAL COURSES FOR TEACHERS AND NURSE PRACTITIONERS

Courses numbered 300–399 are teacher-training courses in the School of Education and in other departments and are especially intended for teachers or prospective teachers. Courses designed to provide instruction to teaching assistants are included. Courses for certification of family nurse practitioners and physician assistants are also included. These courses are open only to students enrolled in those programs.

## OTHER PROFESSIONAL COURSES

Courses numbered 400–499 are professional training courses. Graduate students should consult their faculty adviser or contact the Graduate Studies Office before registering in 400 series courses to determine if graduate credit may be awarded for the course in question.

## PREREQUISITES

Prerequisites for courses should be noted carefully; the responsibility for meeting these requirements rests on the student. If you can demonstrate that your preparation is equivalent to that specified by the prerequisites, the instructor may waive these requirements for you. However, the prerequisite that requires that you complete 84 units before registering in the course may not be waived. The instructor in charge of a course may request that the Registrar drop from the course any student who has enrolled without completing the published prerequisites if, in the judgment of the instructor, failure to have completed that work seriously reduces the probability that the student will successfully complete the course. An instructor who intends to exclude a student for this reason must notify the student before taking action.

## COURSE DESCRIPTIONS

The course offerings and instructors listed in this catalog are subject to change without notice.

For the most current offerings and instructors, refer to the *General Catalog Supplement* at <http://catalog.ucdavis.edu/>.

Below is a sample of how a course is listed in this catalog.

### **190. Proseminar in Nutrition (1)**

Seminar—1 hour. Prerequisite: senior standing; course 111. Discussion of human nutrition problems. Each term will involve a different emphasis among experimental, clinical, and dietetic problems of community, national and international scope. May be repeated two times for credit with consent of instructor. GE credit: SciEng | OL, SE, VL.—F, W, S. (F, W, S.) Zidenberg-Cherr

**Top line** is course number; title; units (in parentheses).

**Paragraph following** is course instructional format; prerequisite; course description; grading, if other than letter grading; GE attributes, if any; quarter offered 2016–17; quarter offered 2017–18 (in parentheses); instructor (if specified).

**Quarters offered** is the quarter in which a course is intended to be given is shown as follows:

- **F.** Fall Quarter (September to December) or Fall Semester (August to December), School of Law
- **W.** Winter Quarter (January to March)
- **S.** Spring Quarter (April to June) or Spring Semester (January to May), School of Law & Veterinary Medicine
- **Su.** Summer Quarter (July to September)

The quarter a course is offered is subject to change. For more information, consult the department.

## Alternate Year Designation

Some course descriptions will include the phrase “Offered in alternate years.” If the course will be offered in the 2016–17 academic year, the quarter designation immediately follows the description. If the course will be offered in the 2017–18 academic year, the quarter designation is inside parentheses.

## Multi-Quarter Courses

A series of course numbers followed by two or three letters (for example, Physics 110A-110B-110C) is continued through three successive quarters, ordinarily from September to June. The first quarter course listed this way is a prerequisite to the second and the second is prerequisite to the third. On the other hand, where A and B portions of a course are listed separately (for example, Economics 160A and 160B), the A course is not a prerequisite to B, unless it is specifically mentioned in the list of prerequisites.

## Expanded Course Descriptions

Because of space limitations, you may find that the descriptions in the *General Catalog* do not include all the information you would like about a course. The faculty has responded to this need by writing the “Expanded Course Descriptions,” giving more detailed explanations about each course offering. These descriptions are available each quarter to assist students in selecting their courses. They contain such information as texts used, preparation required of students, basis for grading, course format, special assignments (papers, field trips, etc.) and a topical outline of the material to be covered.

Copies of the “Expanded Course Descriptions” are available for on-campus use at the College dean's offices or the Biology Academic Success Center, advisers' offices, advising centers, and departmental offices.

## African American and African Studies

(College of Letters and Science)

**Department Office.** 2201 Hart Hall  
530-752-1548; <http://aas.ucdavis.edu>

### Faculty

Wale Adebanwi, Ph.D., Associate Professor  
Moradewun Adejunmobi, Ph.D., Professor  
Milmon F. Harrison, Ph.D., Senior Lecturer  
Laurie Lambert, Ph.D., Assistant Professor  
Bettina Ng'weno, Ph.D., Associate Professor  
Halifu Osumare, Ph.D., Professor  
Elisa Joy White, Ph.D., Associate Professor

### Emeriti Faculty

John Stewart, Ph.D., Professor Emeritus

### The Major Program

African American and African Studies is an interdisciplinary field of study in the humanities, arts, and social sciences. This major introduces students to the social cultural, historical and artistic dimensions of global African Diaspora and Black communities in the United States, Africa, Europe, Asia, Caribbean, Latin America and Pacific regions of the world. The instructors are creative, accessible and highly qualified, with specializations across a range of disciplines. Students are exposed to and trained to think critically about the conditions and demands of global societies. Students may choose to enrich their education studying for a summer, a quarter, or a year in Africa, or by studying for a quarter in the Caribbean. Majors and Minors are also encouraged to take advantage of relevant internship opportunities.

**The Program.** The purpose of this program is to give students a sense of the individual characteristics and common concerns of Black communities in Africa, the United States, and in the wider Diaspora. The African American emphasis includes courses on history, culture, and the impact of developments in politics and the economy on the social organization of Black people in the United States. The African Diaspora emphasis enables students to study the way Black communities outside Africa and the United States have dealt with questions of race and ethnicity. It also considers how they have defined their identity in the political arena as well as by using religion, theater and dance, literature and film. The African emphasis allows students to focus on Africa's recent history, social issues, and contemporary culture.

**Career Alternatives.** Students majoring in African American and African Studies gain knowledge and strong critical thinking and analytical skills, problem-solving skills and communication skills, all suited for advanced studies in the social sciences, law, education and professional schools. Graduates in the major have pursued careers in education, the private and public sectors, the non-profit sector, international development agencies and in human service. The interdisciplinary nature of African American and African Studies is excellent preparation for professions in community organizations such as the Urban League, NAACP and the Office of Economic Opportunity.

### A.B. Major Requirements:

The major program must be developed in consultation with the African American and African Studies Staff Adviser, and approved by the program's Faculty Adviser.

UNITS

#### Preparatory Subject Matter ..... 28

One course from: African American and African Studies 10, 12.....	4
One course from: African American and African Studies 15, 17, 18, 50, 51, 52, 80.....	4

One course from: Anthropology 2; Economics 1A, 1B; Geography 2; Sociology 1; Political Science 1, 2; Psychology 1 .....	4
One course from: Chicana/o Studies 10; Native American Studies 1, 10; Women & Gender Studies 50; American Studies 10; Asian American Studies 1, 2 .....	4
Two courses from: History 15, 17A, 17B.....	8
Four units from: African American and African Studies 16, 51, 54, 154, 155A; Dramatic Art 41A, 41B, 44A, 44B; Music 28, 105, 106.....	4

#### Depth Subject Matter ..... 36

One course from: African American and African Studies 100, 101, 107A, 107B, 107C, 110, 145B, 172, 180.....	4
One course from: African American and African Studies 150A, 150B, 151, 152, 153, 155A, 156, 157, 160, 169, 170, 171, 175A, 175B, 181, 182, 185.....	4
One course from: African American and African Studies 111, 123, 130, 133, 141, 145A, 145B, 156, 162, 163, 165, 172, 176, 177.....	4
A coordinated program of upper division courses, selected and approved in consultation with the major adviser and chosen to reflect the student's major emphasis.....	24
<i>Possible areas of emphasis include the following:</i> Creative arts in the black community worldwide, social and political trends in the global black community, African American society and culture, Africa, African Diasporas. These areas of emphasis are offered as guidelines for students in the major. They are not the only areas of emphasis that students may choose for the major.	

#### Related Upper Division Courses

The following courses are offered by faculty members in other disciplines and focus on African American studies, African diaspora studies, or African studies.

American Studies 156; Anthropology 104N, 139AN, 140A, 140B; Art History 150; Community and Regional Development 151, 151L, 152, 153, 172; Comparative Literature 154, 165; English 167, 178, 179, 181A, 181B; History 102 (O), 115A, 115B, 115C, 115D, 116, 177A, 177B, 178A, 178B; Political Science 134, 149, 176; Sociology 128, 129, 130, 134, 137, 143A, 145A, 145B, 130; Dramatic Art 155A; Women's Studies 160, 178C, 180, 182

#### Total Units for the Major ..... 64

**Major Adviser.** Contact Program office.

#### Minor Program Requirements:

UNITS

#### African American and African Studies ... 24

Select one course from: African American and African Studies 10, 12, 15, 17, 18, or 80.....	4
Select any five upper division courses offered in African American and African Studies, but not including African American and African Studies 154.	

Note: Although a course may be listed more than once, such a course may satisfy only one requirement.

**American History and Institutions.** This University requirement can be satisfied by completion of African American Studies 10, 100; see also under University Requirements, on page 106.

## Courses in African American and African Studies (AAS)

### Lower Division

#### 10. African-American Culture and Society (4)

Lecture—3 hours; discussion—1 hour. Critical examination of the historical, political, social, and economic factors that have affected the development and status of African-American people in contemporary society. GE credit: SocSci, Div | ACGH, DD, SS, WE.—F. (F.) Harrison

#### 12. Introduction to African Studies (4)

Lecture/discussion—4 hours. Introduction to African Studies will focus on the various disciplinary perspectives through which African society and culture are generally studied. A survey of methods, resources and conceptual tools for the study of Africa. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.—W. (W.) Adebanwi, Adejunmobi

#### 15. Introduction to African American Humanities (4)

Lecture—3 hours; discussion—1 hour. Class size limited to 165 students. Introduction to the humanist tradition developed by writers, philosophers, and artists of African descent in the West. Attention also given to African sources, as well as European, Caribbean, Latin-American, and North American variations on this tradition. GE credit: Wrt | ACGH, AH, DD.—W. (W.) Harrison

#### 16. Verbal and Performance Arts in Africa (4)

Lecture/discussion—4 hours. African verbal arts; oral texts from different African cultures. Types of critical response to oral texts, role of oral artists, context and esthetics of oral performance in Africa. GE credit: ArtHum, Div, Wrt | AH, VL, WC.—W. (W.) Adejunmobi

#### 17. Women in African Societies (4)

Lecture/discussion—4 hours. Gender relations in traditional and contemporary African society. Involvement of African women in politics, religion, the economy, the arts. African responses to feminist theory. Images of women in African literature. GE credit: SocSci, Div, Wrt | SS, WC, WE.—F. (F.) Adejunmobi

#### 18. Introduction to Caribbean Studies (4)

Lecture—3 hours; discussion—1 hour. Introduction to the contemporary culture, peoples, politics, and societies of the Caribbean. Topics include movements of people, goods and ideas across the Atlantic world and creative productions within the Caribbean. GE credit: ArtHum or SocSci | AH or SS, WC.—F. (F.) Ng'weno

#### 50. Black Popular Culture (4)

Lecture—3 hours; discussion—1 hour. Survey of the African American images in popular culture (film, television, comedy, sports and music). GE credit: AH or SS, WC.—S. (S.) Harrison, White

#### 51. History of Afro American Dance (4)

Lecture—4 hours. Evolution of African-American dance, tracing its history and development from West and Central Africa to the United States. Investigates the social and cultural relevance of African American dance and its artistic merits through contributions from its choreographers and performers. GE credit: ArtHum | AH, DD, VL.—S. (S.)

#### 52. African Traditional Religion (4)

Lecture—2 hours; discussion—2 hours. Introduction to traditional religions of the sub-Saharan African peoples: emphasis on myths, rituals and symbols in West, East, Central and South African indigenous religions. Examines themes: sacred kingship, divination system, women, prophecy, conversion and adaptation to Islam and Christianity. GE credit: ArtHum, Div, Wrt | AH, WC.—W. (W.)

#### 80. Introduction to Black Politics (4)

Lecture—4 hours. Introduction to the analysis of Afro-American politics, using conceptual frameworks from political science and other social sciences. GE credit: SocSci, Div, Wrt.—S. (S.) Harrison

**Fall 2011 and on Revised General Education (GE): AH=Arts and Humanities; SE=Science and Engineering; SS=Social Sciences;**

**ACGH=American Cultures; DD=Domestic Diversity; OL=Oral Skills; QL=Quantitative; SL=Scientific; VL=Visual; WC=World Cultures; WE=Writing Experience**

**Pre-Fall 2011 General Education (GE): ArtHum=Arts and Humanities; SciEng=Science and Engineering; SocSci=Social Sciences; Div=Domestic Diversity; Wrt=Writing Experience**

**Quarter Offered: F=Fall, W=Winter, S=Spring, Su=Summer; 2017-2018 offering in parentheses**

**99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division****100. Survey of Ethnicity in the U.S. (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Limited enrollment. Sociological and historical analysis of the experience, culture, and relations of and between groups considered racial and/or ethnic minorities in the United States. GE credit: ArtHum | ACGH, AH, DD. —W. (W.) Harrison

**101. Introduction to Research in the Afro-American Community (4)**

Lecture—4 hours. Prerequisite: course 10 or consent of instructor. Introductory survey of Afro-American Studies methods and techniques; problems and methodology in Afro-American Studies. —S. (S.) Harrison, White

**107A. African Descent Communities and Culture in the Caribbean and Latin America (4)**

Lecture/discussion—4 hours. Prerequisite: upper division standing. Origin and development of African descent communities and cultures in the Caribbean, and Latin America. The similarities and differences among African descent communities and cultures in terms of religious practices, music, and national identity. GE credit: ArtHum, Div, Wrt | WC. —F. (F.) Lambert, Ng'weno

**107B. African Descent Communities and Culture in North America (4)**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: upper division standing. Origin and development of African descent communities and culture in the U.S.A., Canada, and Mexico from the African slave trade to contemporary urban society. Offered in alternate years. GE credit: ArtHum, Div, Wrt. —(F.) White

**107C. African Descent Communities and Culture in Asia (4)**

Lecture/discussion—4 hours. Study of the origin and development of African Descent communities and cultures in Asia. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC. —W. (W.) Ng'weno

**107D. African Descent Communities and Cultures in Europe (4)**

Lecture/discussion—4 hours. Study of the origin and development of African Descent communities and cultures in Europe. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC. —S. (S.) White

**110. West African Social Organization (4)**

Lecture—4 hours. Ecology, population, social and political organization, and culture of West Africa in the precolonial, colonial, and post-colonial periods. GE credit: SocSci, Div | SS, WC. —F. (F.) Adebanwi, Adejunmobi

**111. Cultural Politics in Contemporary Africa (4)**

Lecture/discussion—4 hours. Prerequisite: upper division standing or course 12. Themes and style of new cultural forms in Africa as displayed in art, music, film and writing, especially in regard to blending of indigenous and foreign influences. Social and political forces shaping contemporary cultural expression. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC. —(W.) Adebanwi, Adejunmobi

**123. Black Female Experience in Contemporary Society (4)**

Lecture—4 hours. Prerequisite: upper division standing or consent of instructor. Black female social, intellectual, and psychological development. Black women's contributions in history, literature, and social science; life experiences of Black women and philosophical underpinnings of the feminist movement. Offered in alternate years. GE credit: ArtHum or SocSci, Div | ACGH, DD, SS. —S. (S.) Lambert

**130. Education in the African-American Community (4)**

Lecture—2 hours; discussion—1 hour; fieldwork—3 hours. Prerequisite: course 10 or course 100, completion of the subject A requirement. Examination of the history of the education of African Americans in the United States. Examination and critique of contemporary theories concerning the schooling of African Americans. (Former course 140.) Offered irregularly. GE credit: SocSci | DD, SS. —F. (F.)

**133. The Black Family in America (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Analysis of social science research to examine relationship between black (African-descent) family structures, patterns of functioning, and political, economic, and social conditions in the U.S. Offered in alternate years. GE credit: SocSci, Div | ACGH, DD, SS. —S. Su. (S. Su.) Harrison

**141. Psychology of the African American Experience (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: course 10 or consent of instructor. Introduction to the psychological issues faced by African Americans. Analysis of issues from European/Western and Afro-centric frame of reference. Emphasis on Optimal Theory, a psychological theory based on an Afro-centric world view. —S. (S.)

**145A. Black Social and Political Thought (4)**

Lecture—4 hours. Prerequisite: course 10 or 80, or consent of instructor. Exploration and analysis of Black social and political thought in the Americas. Offered in alternate years. GE credit: SocSci, Div | SS. —W. (W.) Harrison

**145B. Black Intellectuals (4)**

Lecture—4 hours. Prerequisite: course 10, 80, 145A, or consent of instructor. Exposition and critical analysis of selected theoretical writings of Black intellectuals, and especially political and social thinkers, in the Americas. Offered in alternate years. GE credit: SocSci, Div | DD, SS, WE. —F. (F.) Harrison, Lambert

**150A. Afro-American Visual Arts Tradition: A Historical and Cultural Study (4)**

Lecture—4 hours. Prerequisite: upper division standing. Afro-American visual arts tradition, folk and formal, in historical and cultural context, from 1600 through Reconstruction. GE credit: ArtHum, Div. —F. (F.)

**150B. Afro-American Visual Arts Tradition: A Historical and Cultural Study (4)**

Lecture—4 hours. Prerequisite: upper division standing. Afro-American visual arts tradition, folk and formal, in historical and cultural context, from Reconstruction to the present. GE credit: ArtHum, Div. —W. (W.)

**151. Afro-American Vernacular Music and Verbal Arts (4)**

Lecture—2 hours; discussion—2 hours. Socio-political dimensions of Afro-American musical forms like spiritual, work song, minstrelsy blues, rhythm and blues, jazz, gospel, soul and contemporary pop, and related verbal arts like preaching, toasting, rapping. —S. (S.)

**152. Major Voices in Black World Literature (4)**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: upper division standing, completion of course 10, or course 12, or course 18. Recurrence of cultural tropes in the works of major black world authors and formation of an African-oriented canon. Principal activities include critical reading and discovery of literature as a cultural resource. Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, DD, WC, WE. —(W.) Adejunmobi

**153. African Literature (4)**

Lecture—3 hours; term paper. Prerequisite: completion of Entry Level Writing Requirement (ELWR). Colonial and post-colonial sub-Saharan African literature and the African oral traditions from which it emerged. Genres and themes of African literature

from the nineteenth century to the present. (Same course as Comparative Literature 154.) Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, WC, WE. —S. (S.) Adejunmobi

**155A. African-American Dance and Culture in the United States, Brazil and the Caribbean (4)**

Lecture/discussion—4 hours. Comparative study of the African American dance forms in the U.S.A., Brazil, Haiti, Cuba, Jamaica, Barbados, and Trinidad. Examination of ritual, folk, and popular dance forms and the socio/historical factors that have influenced these forms. (Same course as Dramatic Art 155A.) GE credit: ArtHum | AH, VL, WC. —W. (W.)

**156. Language and Identity in Africa and the African Diaspora (4)**

Lecture/discussion—4 hours. Prerequisite: upper division standing or course 12. Relationship between language and identity in literature from Africa and the African Diaspora. Use of pidgins, Creoles, translation from African languages and impact of language policies. Offered irregularly. GE credit: ArtHum, Div | AH, DD, WC. —S. (S.) Adejunmobi

**157. Literature and Society in South Africa (4)**

Lecture/discussion—4 hours. Prerequisite: upper division standing. Political and social developments in 20th-century South Africa as illustrated by a range of South African writing. Response of different writers to race relations, impact of government policy on types and context of writing. Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, WC, WE. —(W.) Adejunmobi

**160. African-American Folklore (4)**

Lecture—2 hours; discussion—1 hour; fieldwork—3 hours. Prerequisite: course 10. Theory and history of African American folklore and folklife, including music, material culture, oral narrative, proverbs, and humor. African and Caribbean cultural influences on New World folk genres will be probed. GE credit: ArtHum, Div. —S. (S.)

**162. Islam in Africa and the Americas (4)**

Lecture/discussion—4 hours. Prerequisite: Religious Studies 60 or course 12 or course 110. Comparative and historical survey of Islam in the regional and cultural settings of Sub-Saharan Africa and the Americas. Offered irregularly. GE credit: ArtHum, Div, Wrt | AH, WC, WE. —S. (S.)

**163. African Religions in the Americas (4)**

Lecture—2 hours; discussion—2 hours. Prerequisite: course 10; course 15 or consent of instructor. Comparative study of African religious heritage in the Americas: Jamaica, Trinidad, Cuba, U.S.A., Haiti, and Brazil. Emphasis on the origins and development of Candomble, Santeria, Shango, Vodun, and Rastafarianism in the New World. (Former course 153.) GE credit: ArtHum, Div, Wrt | AH, WC, WE. —S. (S.)

**165. Afro-Christianity and the Black Church (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing; course 10, 15 or consent of instructor. Examination of the historical role of Christianity belief and practice as well as the institution of the Black Church in the experience of African Americans, from slavery to the present. Offered in alternate years. GE credit—SocSci, Div | ACGH, DD, SS. —(S.) Harrison

**168. Black Documentary: History and Practice (4)**

Lecture—3 hours; laboratory—5 hours. Prerequisite: Film Studies 1, course 170; course 50 recommended; consent of instructor. Study of Black documentary history and understanding of the use of the documentary form for political purposes. A discussion of documentary theory. Each student, singly or in a team, will create and carefully edit a documentary project. GE credit: ArtHum, Div | AH, DD, VL, WC. —S. Su. (Su.)

**169. History of African-American Television (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 50 recommended. History of the representation of African Americans in television; how the representations reflect social and political forces in American society. Role of African Americans in actively shaping their representation. GE credit: ArtHum, Div | AH, DD, VL, WE.—W. White

**170. African-American Film and Video (4)**

Lecture—3 hours; film viewing—3 hours. Prerequisite: Film Studies 1, course 50 recommended. Comparative approach in the study of fictional film and video dealing with the African American experience drawing on film and cultural studies to examine and discuss selected works. GE credit: ArtHum, Div, Wrt | AH, DD, VL, WE.—W. (W.) Lambert, White

**171. Black African and Black European Film and Video (4)**

Lecture/discussion—3 hours; film viewing—3 hours; term paper. Prerequisite: one of course 15, 50, or English 160 or 162, or consent of instructor. Comparative approach in the study of dramatic films and videos that treat black life in Africa and Europe. Critical attention will focus on the imaginative construction of ethnicity, race, nationality, gender, and sexuality in each particular work. Offered in alternate years. GE credit: ArtHum, Div | AH, VL, WC.—S. White

**172. Diaspora and New Black Identities (4)**

Lecture/discussion—3 hours; term paper. Critical analysis about what it means to be Black/African American in the United States today. Topics include old and new diasporas, immigration, national origin, language, religion, class, education, politics, identity and cultural heritage. GE credit: SocSci, Div, Wrt | ACGH, DD, SS, WE.—W. (W.) Lambert

**175A. Black Documentary: History and Theory (4)**

Lecture—3 hours; film viewing—3 hours. Prerequisite: Film Studies 1, course 170; course 50 recommended. Black documentary history and documentary theory. Use of black documentary for political purposes. Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, DD, VL, WE.—(S.) Lambert, White

**175B. Black Documentary Practicum (4)**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 175A and consent of instructor. Creation of documentary projects, with students working in production crews. Offered in alternate years. GE credit: ArtHum | AH, DD.—W. S.

**176. The Politics of Resources (4)**

Lecture/discussion—4 hours. Prerequisite: course 12 or 110. Limited enrollment. Examination of the ways in which the processes of the extraction, purification and use of natural resources and the complex regimes of valuation and commodification they (re)produce lead to cooperation and conflict in contemporary Africa and beyond. GE credit: SocSci | SS, WC.—S. (S.) Adebanwi

**177. Politics of Life in Africa (4)**

Lecture/discussion—4 hours. Existing (in)capacities in the structures of state and society in Africa for people to live well. Topics include institutions and practices that define state and civil society encounters in Africa; democracy, ethnicity, economic crisis, religion, citizenship, etc. Offered in alternate years. GE credit: ArtHum or SocSci | AH or SS, WC.—(W.) Adebanwi

**178. African Modernity and Globalization (4)**

Lecture—4 hours. Prerequisite: course 12 or consent of instructor. Class size limited to 80 students. Exploration of modernity and globalization and their dimensions and impacts in/on Africa. Examination of modern necessities and constraints in Africa in relation to (neo)colonialism, transnational encounters, technology, gender, risk, ritual, identity, culture, etc. GE credit: ArtHum or SocSci | AH or SS, WC.—W. (W.) Adebanwi

**180. Race and Ethnicity in Latin America (4)**

Lecture/discussion—4 hours. The social and political effects of racial and ethnic categorization in Latin America, including issues of economic production, citizenship, national belonging, and access to resources. Emphasis is on peoples of African, Indigenous, and Asian descent. GE credit: ArtHum or SocSci, Div | SS, WC, WE.—W. (W.) Ng'wenyo

**181. Hip Hop in Urban America (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of the instructor. Must have Junior or Senior level standing. History, aesthetics, urban context, and economics of hip-hop in the US, and its globalization. Hip-hop's four artistic elements—rap, deejaying, breakdance, and aerosol art—allow the examination of issues of race, ethnicity, and gender in youth culture and American society. GE credit: ArtHum | AH, DD, VL.—S. (S.)

**182. Hip Hop Culture & Globalization (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 181 preferable, not required. Investigation of hip-hop youth cultures outside the United States using globalization and Cultural Studies theories. Analysis of international hip-hop sites in Africa, Asia, Europe, South America, and the Middle East through reading, discussion, and visiting virtual sites. Offered in alternate years. GE credit: ArtHum, Div | AH, WC.—S. (S.) White

**185. Topics in African-American Film (4)**

Lecture—3 hours; film viewing—3 hours. Prerequisite: course 170; course 50 recommended. Intensive study of special topics in African American film. May be repeated one time for credit. GE credit: ArtHum, Div, Wrt | AH, DD, VL, WE.—W. (W.) Lambert, White

**190. Topics in African and African-Diaspora Studies (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing in African American and African Studies or consent of instructor. Intensive treatment of a special topic or problem in African or African Diaspora Studies. May be repeated one time for credit when topic differs.—S. (S.)

**192. Internship in African-American and African Studies (1-8)**

Internship—3-24 hours. Prerequisite: completion of 12 units of upper division study in African American and African Studies courses; upper division standing; consent of instructor. Restricted to African American and African Studies majors and minors. Supervised internship in community, government, or private institutions, in all subject areas offered by the African American and African Studies Program. May be repeated up to 12 units for credit. (P/NP grading only.)

**197T. Tutoring in Afro-American Studies (1-5)**

Tutoring—1-5 hours. Prerequisite: consent of major committee; upper division standing with major in Afro-American Studies. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit for a total of six units. (P/NP grading only.)

**198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate****201. Critical Foundations in African American Studies (4)**

Seminar—3 hours. Prerequisite: graduate standing. Introduction to history of African American Studies. Topics include: research agendas, policy implications, debates, crises, and institutional frameworks. Offered in alternate years.—(F.)

**202. Critical Foundations in African Studies (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Introduction to the history and current organization of African Studies as area of intellectual investigation. Offers students an opportunity to review research agenda and policy implications, debates, crises, and institutional frameworks surrounding the production of knowledge about Africa. Offered in alternate years.—S. Adebanwi, Adejumobi

**203. Critical Foundations in African Diaspora Studies (4)**

Seminar—3 hours; term paper. Integrative conceptual framework includes History, Geography, Political Economy, Culture, Aesthetics as tools to investigate the African Diaspora. Students engage African Diaspora theories within their research projects understanding issues developing from the movement of Africans to the rest of the world.—S. (W.) Lambert, White

**204. Methodologies in African American and African Studies (4)**

Seminar—3 hours; term paper. Relationship between theory and methodology, with emphasis on identifying relevant methodological approaches and constructing theoretically informed research projects for studying the experience of people of African descent whether on the African continent or in the rest of the world.—F. Harrison, Ngwenyo

**298A. Directed Group Study in African American and African Diaspora Studies (1-5)**

Prerequisite: graduate standing. May be repeated for credit up to three times. (S/U grading only.)

**298B. Directed Group Study in African Studies (1-5)**

May be repeated for credit up to three times. (S/U grading only.)

**299. Directed Group Study in African Studies (1-12)**

(S/U grading only.)

## Agricultural and Environmental Chemistry (A Graduate Group)

William R. Horwath, Ph.D., Chairperson of the Group

**Group Office.** 4117 Meyer Hall 530-752-4516; <http://agchem.ucdavis.edu/>

**Faculty.** The more than 70 faculty in the graduate group represent at least 13 academic departments within the College of Agricultural and Environmental Sciences, the College of Letters and Science, the College of Engineering, the School of Medicine, and the School of Veterinary Medicine.

**Graduate Study.** The Graduate Group in Agricultural and Environmental Chemistry offers programs of study and research leading to the M.S. and Ph.D. degrees. Study relates to the chemical and biochemical aspects of foods, wine, fibers/polymers, pesticides, and environmental pollution. Detailed information regarding graduate study may be obtained at <http://agchem.ucdavis.edu/>.

**Graduate Advisers.** D.O. Adams (*Viticulture and Enology*), Y. Hsieh (*Textiles and Clothing*), A.E. Mitchell (*Food Science and Technology*), T. Shiba-moto M. Hengel (*Environmental Toxicology*), S. Parikh (*Land, Air and Water Resources*), W.R. Horwath (*Land, Air and Water Resources*), T. Young (*Civil and Environmental Engineering*)

## Courses in Agricultural and Environmental Chemistry (AGC)

### Graduate

#### 290. Seminar (1)

Seminar—1 hour. Selected topics in agricultural and environmental chemistry, presented by students. (S/U grading only.)—F, W, S. (F, W, S.)

#### 298. Group Study (1-5)

Prerequisite: consent of instructor. The chemistry and biochemistry of foods, nutritional chemicals, pesticides, and other special topics as they apply to agricultural and environmental chemistry.

#### 299. Research (1-12)

Arrangements should be made well in advance with a faculty member of the Group in Agricultural and Environmental Chemistry. (S/U grading only.)

## Agricultural and Environmental Education

(College of Agricultural and Environmental Sciences and School of Education)

### The Major Program

The major serves those interested in teaching agricultural and environmental sciences in schools or in non-formal settings such as nature preserves, environmental camps, or other venues. This major prepares graduates to direct programs in the agricultural and environmental sciences as well as provides them with a skill set necessary to work within social science careers related to these fields. This program of study meets state and federal requirements for entry into teacher preparation in agriculture and science, as well as requirements in Career Technical Education (CTE).

### The Program

The program is designed to provide students with a broad background in various agricultural and environmental science disciplines, e.g., animal science, environmental science, plant and soil science, agricultural engineering, business management, agro ecology, and horticulture. The program also focuses on the social sciences related to human resource development. The program provides students with practical experiences through fieldwork, school, and non-formal learning sites placements, or placement in sites related to a student's focus of study. Through this major students will have the opportunity to explore and then incorporate agricultural and environmental issues into educational and development settings.

### Career Alternatives

The need for scientists, technicians and educators to assist in domestic and international agricultural and environmental programs has created a continuing demand for qualified instructors and supervisory personnel. This major also provides general preparation which is appropriate for work in banking, sales and service, rural recreation and related agricultural and environmental sectors. Students interested in obtaining breadth in both agricultural and environmental sciences will appreciate the scope and flexibility the major provides.

### B.S. Major Requirements (AEE):

Units

#### Government/U.S. Constitution ..... 4

History 17A or Political Science 1 ..... 4

#### Preparatory Subject Matter ..... 50

A minimum of eight (8) units is required in each area of Animal Science, Agricultural Business and Economics, Applied Biological Systems Technology, Environmental Horticulture, Environmental Science and Natural Resources; and Plant and Soil Science.

Animal Science 1, 2, 21, 41 .....	8
Applied Biological Systems Technology 16, 52, 49, 101 .....	9
Agricultural & Resource Economics 15 and either Economics 1A or 1B .....	8
Environmental Horticulture 1, 6, Plant Sciences 5 .....	9
Environmental Science and Policy 10; Environmental Toxicology 10, Hydrologic Science 10, 47 .....	8
Plant Sciences 1, 2, 15, 49; Viticulture and Enology 2, 3 .....	8
<b>Science/Math Preparatory ..... 43-45</b>	
Biological Sciences 2A & 2B .....	10
Chemistry 2A & 2B .....	10
Geology 1, 20, Soil Science 10 .....	9
Mathematics 16A & 16B, or 17A&B, or 21A&B .....	6-8
Physics 7A & 7B .....	8

#### Depth Subject Matter ..... 20

Agricultural Education 100 & 160 .....	6
Education 110, 115, 142 .....	10
Environmental Science and Policy 110 ....	4

#### Focused Depth Subject Matter ..... 16

The specialized focus will consist of a minimum of 16 units in one of the six areas listed below:

*Agricultural Business and Economics:*  
Agricultural and Resource Economics 100A, 100B, 120, 130, 135, 138, 140, 150, 175, 176

*Animal Science:* Select upper division units from any Animal Genetics, Animal Science, Avian Sciences course or Animal Biology 102; Food Science and Technology 109; Nature and Culture 140; Neurobiology, Physiology, and Behavior 101, 121; Nutrition 115, 122, 123

*Applied Biological Systems Technology:*  
Applied Biological Systems Technology 121, 142, 161, 165, 175, 180, 182

*Environmental Horticulture:* Environmental Horticulture 102, 105, 120, 129, 125, 133, 160; Nature and Culture 120, Plant Sciences 150

*Environmental Science and Natural Resources:* Environmental and Resource Sciences 121, 131; Environmental Science and Policy 100, 101, 110, 116, 123, 151, 161, 170, EVE 101, 115, 134; Plant Sciences 101, 105, 110A; Wildlife, Fish, and Conservation Biology 110, 111, 120, 154

*Plant and Soil Science:* Plant Biology 102, 105, 116, 117, 160, 172, 176; Plant Sciences 150; Soil Science 100, 102, 118; Viticulture and Enology 101A, 101C

#### Restricted Electives ..... 16

At least four additional upper division courses (minimum 16 units; duplicate from Depth specialization courses not counted) selected with approval of an adviser to supplement or expand depth subject matter courses chosen from Animal Biology, Animal Genetics, Animal Science, Agricultural and Resource Economics, Avian Sciences, Environmental Horticulture, Environmental and Resource Sciences, Environmental Sciences and Policy, Food Science and Technology, International Agricultural Development, Nature and Culture, Neurobiology, Physiology, and Behavior, Nutrition, Plant Sciences, Plant Biology, or Viticulture and Enology.

#### Total Units For Major ..... 149-151

**Master Adviser.** Cary J. Trexler, Associate Professor

**Major Advisers.** Lynn Martindale, Lecturer/Supervisor School of Education; Cary J. Trexler, Associate Professor

**Undergraduate Advising Center** for the major (including peer advising) is located in the Animal Science Advising Center in 1202 Meyer Hall 530-754-7915; <http://asac.ucdavis.edu/>.

## Agricultural and Environmental Education

### Courses in Agricultural Education (AED)

Questions pertaining to the following courses should be directed to the instructor or Lynn Martindale 530-754-6655.

### Lower Division

#### 92. Internship (1-12)

Internship—3-36 hours. Prerequisite: lower division standing; consent of instructor. Supervised internship off and on campus in areas of agricultural education. (P/NP grading only.)

#### 98. Directed Group Study (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S. (F, W, S.)

#### 99. Special Study for Undergraduates (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S. (F, W, S.)

### Upper Division

#### 100. Concepts in Agricultural and Environmental Education (3)

Lecture—2 hours; laboratory—3 hours. Prerequisite: upper division standing. Philosophy and nature of formal and non-formal agricultural and environmental education programs. Emphasis on understanding the role of the teacher and observing a variety of programs. GE credit: SocSci, Wrt.—W. (W.) Martindale

#### 160. Vocational Education (3)

Lecture—3 hours. Philosophy and organization of vocational education, with particular reference to educational principles for agriculture commerce, home economics, and industry. GE credit: SocSci, Wrt.—F. (F.)

#### 171. Audiovisual Communications (2)

Lecture—1 hour; laboratory—3 hours. Prerequisite: upper division standing. Theory and principles of audiovisual communications. Comparison of audiovisual materials such as transparencies, slides, computer-generated graphics, and videos. Operation and use of audiovisual equipment is stressed. Offered irregularly.

#### 172. Multimedia Productions (3)

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 171 recommended. Design and production of educational, technical, and professional multimedia presentations. Instructional or professional presentations using a variety of media, including slides, video, transparencies, and computer-generated graphics. Offered irregularly. GE credit: SocSci, Wrt.

#### 190. Seminar in Agricultural Education (2)

Seminar—2 hours. Discussion of selected critical issues in agricultural education. May be repeated for credit with consent of instructor. (P/NP grading only.)—W. (W.)

#### 192. Internship (1-12)

Internship—3-36 hours. Prerequisite: upper division standing; consent of instructor. Supervised internship off and on campus in areas of agricultural education. (P/NP grading only.)

#### 198. Directed Group Study (1-5)

(P/NP grading only.)

#### 199. Special Study for Advanced Undergraduates (1-5)

(P/NP grading only.)

### Professional

#### 300. Directed Field Experience in Teaching (2)

Discussion—1 hour; field experience—3 hours. Prerequisite: course 100. Experience as teaching assistant in agriculture or home economics programs in public schools. May be repeated one time for credit. (S/U grading only.)

#### 301. Planning for Instructional Programs (3)

Lecture—3 hours. Prerequisite: course 100; course 300 (may be taken concurrently). Major paradigms in program planning and development. Emphasis on

key steps in curriculum development, including selection and organization of educational objectives, learning experiences and teaching materials and resources.—S. (S.) Trexler

### **302. Teaching Methods in Agricultural Education (3)**

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 100, course 300 (may be taken concurrently). Development of teaching strategies with special emphasis on the designing of learning experiences, instructional execution, and use of teaching aids in agricultural education.

### **306A. Field Experience with Future Farmers of America and Supervised Experience Programs (4)**

Lecture/discussion—2 hours; field work—6 hours. Prerequisite: acceptance into a teacher education program; course 306B (concurrently). Develop an understanding of the Future Farmers of America and supervised occupational experience programs through planning, conducting, and evaluating actual programs. Offered irregularly.

### **306B. Field Experience in Teaching Agriculture (5-18)**

Student teaching (corresponds with public school session). Prerequisite: acceptance into a teacher education program; course 306A (concurrently); courses 100, 300, 301, 302. Directed teaching including supervision of occupational experience programs and youth activities in secondary schools or community colleges. May be repeated for credit up to a maximum of 18 units. Offered irregularly.

### **323. Resource Development: Agricultural Education (3)**

Lecture—3 hours. Prerequisite: courses 306A, 306B. Selection and implementation of community resources in teaching.

### **390. Seminar: Issues in Agricultural Education (2)**

Discussion/laboratory—4 hours. Prerequisite: acceptance into a teacher education program and courses 306A-306B. Discussion and evaluation of current issues, theories and research in agricultural education. (S/U grading only.)

## **Agricultural and Managerial Economics**

See Managerial Economics, on page 415.

## **Agricultural and Resource Economics**

(College of Agricultural and Environmental Sciences) Richard J. Sexton, Ph.D., Chair of the Department

**Department Office.** 2116 Social Sciences and Humanities Building 530-752-9995

Undergraduate Student Information for the Managerial Economics major, 1176 Social Sciences and Humanities Building 530-754-9536; <http://manecon.ucdavis.edu>

Graduate Student Information, 1171 Social Sciences and Humanities Building 530-752-6185; <http://www.agecon.ucdavis.edu>

### **Faculty**

Julian M. Alston, Ph.D., Distinguished Professor  
Timothy Beatty, Ph.D., Professor  
Stephen R. Boucher, Ph.D., Associate Professor  
Colin A. Carter, Ph.D., Distinguished Professor  
Michael R. Carter, Ph.D., Professor  
James A. Chalfant, Ph.D., Professor  
Dalia A. Ghanem, Ph.D., Assistant Professor  
Rachael E. Goodhue, Ph.D., Professor

Richard D. Green, Ph.D., Professor  
Jens Hilscher, Ph.D., Associate Professor  
Lovell S. Jarvis, Ph.D., Professor  
Katrina K. Jessoe, Ph.D., Associate Professor  
Kristin Kiesel, Ph.D., Lecturer  
Douglas M. Larson, Ph.D., Professor  
C.-Y. Cynthia Lin Lawell, Ph.D., Associate Professor (*Agricultural and Resource Economics, Environmental Science and Policy*)  
Travis J. Lybbert, Ph.D., Professor  
Pierre R. Mérél, Ph.D., Associate Professor  
Kevin M. Novan, Ph.D., Assistant Professor  
Quirino Paris, Ph.D., Professor  
Richard J. Sexton, Ph.D., Professor  
Aaron D. Smith, Ph.D., Professor  
Daniel A. Sumner, Ph.D., Distinguished Professor  
J. Edward Taylor, Ph.D., Professor  
James Wilen, Ph.D., Distinguished Professor  
*Distinguished Graduate Mentoring Award*  
Jeffrey C. Williams, Ph.D., Professor

### **Emeriti Faculty**

Hoy F. Carman, Ph.D., Professor Emeritus  
Y. Hosseini Farzin, Ph.D., Professor Emeritus  
B. Delworth Gardner, Ph.D., Professor Emeritus  
Arthur M. Havener, Ph.D., Professor Emeritus  
Richard E. Howitt, Ph.D., Professor Emeritus  
Warren E. Johnston, Ph.D., Professor Emeritus  
Karen Klonsky, Ph.D., Specialist in Cooperative Extension Emeritus  
Samuel H. Logan, Ph.D., Professor Emeritus  
Philip L. Martin, Ph.D., Professor Emeritus  
Alexander F. McCalla, Ph.D., Professor Emeritus  
Chester O. McCorkle, Jr., Ph.D., Professor Emeritus  
Refugio I. Rochin, Ph.D., Professor Emeritus  
Lawrence E. Shepard, Ph.D., Senior Lecturer SOE Emeritus

### **Affiliated Faculty**

Leslie J. Butler, Ph.D., Specialist in Cooperative Extension  
John H. Constantine, Ph.D., Lecturer  
Roberta L. Cook, Ph.D., Specialist in Cooperative Extension  
Shermain D. Hardesty, Ph.D., Specialist in Cooperative Extension  
Hyunok Lee, Ph.D., Professional Researcher  
Gerald T. Lundblad, M.B.A., Lecturer  
John Maxey, M.B.A., J.D., Lecturer  
Tina L. Saitone, Ph.D., Associate Project Scientist  
Stephen A. Vosti, Ph.D., Adjunct Professor  
Marilyn D. Whitney, Ph.D., Lecturer

**Major Program.** See the undergraduate program in [Managerial Economics, on page 415](#).

**Major Advisers.** Contact the Department office.

**Related Courses.** See courses in Economics and Environmental Science and Policy.

## **Courses in Agricultural and Resource Economics (ARE)**

### **Lower Division**

#### **1. Economic Basis of the Agricultural Industry (4)**

Lecture—4 hours. Agriculture and man; the agricultural industry in U.S. and world economies; production and supply, marketing and demand; agricultural land, capital and labor markets; economic and social problems of agriculture in an urban and industrialized economy emphasizing California. GE credit: SocSci | SS.

#### **1S. Economic Basis of the Agricultural Industry (4)**

Lecture—4 hours. Agriculture and man; the agricultural industry in Australia and world economies; production and supply, marketing and demand; agricultural land, capital and labor markets; economic and social problems of agriculture in an urban and industrialized economy emphasizing Australia. Taught in Australia under the supervision of a UC Davis faculty member. Not open for credit to students who have completed course 1. GE credit: SocSci | SS, WC.

### **15. Population, Environment and World Agriculture (4)**

Lecture—3 hours; discussion—1 hour. Economic analysis of interactions among population, environment, natural resources and development of world agriculture. Introduces students to economic thinking about population growth, its causes and consequences for world food demand, and environmental and technological limits to increasing food supplies. GE credit: SocSci, Div, Wrt | SS, WC, WE, —W. (W)

### **18. Business Law (4)**

Lecture—4 hours. Prerequisite: sophomore standing. General principles of business law in the areas of contracts, business organization, real property, uniform commercial code, sales, commercial paper, employment relations, and creditor-debtor against a background of the history and functioning of our present legal system. GE credit: SocSci | SS. —F, S, Su. (F, S, Su.)

### **98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. Restricted to lower division students. (P/NP grading only.) Offered irregularly. GE credit: SS.

### **99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) GE credit: SS.

### **Upper Division**

#### **100A. Intermediate Microeconomics: Theory of Production and Consumption (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A, 1B; Mathematics 16C. Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM), and Textiles and Clothing (ATXC) Majors and Agricultural and Resource Economics (GARE), International Agricultural Development (GIAD), Viticulture and Enology (GVEN) and Transportation Technology and Policy (GTTP) Graduate Majors. Theory of individual consumer and market demand; theory of production and supply of agricultural products, with particular reference to the individual firm; price determination, and employment of resources under pure competition. Not open for credit to students who have completed Economics 100. GE credit: SocSci | QL, SS. —F, W, S, Su. (F, W, S, Su.)

#### **100B. Intermediate Microeconomics: Imperfect Competition, Markets and Welfare Economics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A. Pass One open to Managerial Economics Majors (AMGE) and Agricultural and Resource Economics (GARE) Graduate Majors. Price determination, and employment of resources under conditions of monopoly, oligopoly, and monopolistic competition. GE credit: SocSci | QL, SS. —F, W, S, Su. (F, W, S, Su.)

### **106. Econometric Theory and Applications (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A, Statistics 103. Pass One open to Managerial Economics Majors (AMGE) and Agricultural and Resource Economics (GARE) Graduate Majors. Statistical methods for analyzing data to solve problems in managerial economics. Topics include the linear regression model, methods to resolve data problems, and the economic interpretation of results. Not open for credit to students who have enrolled in or completed Economics 140. GE credit: SocSci | QL, SS. —F, W, S, Su. (F, W, S, Su.)

### **107. Econometrics for Business Decisions (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 106. Pass One open to Managerial Economics majors; Pass Two open to majors in the College of Agricultural and Environmental Sciences. Covers state-of-the art econometric and statistical methods for causal and predictive modeling with applications to finance and marketing. GE credit: SocSci | SS. —F, W, S. (F, W, S.)

**Fall 2011 and on Revised General Education (GE): AH=Arts and Humanities; SE=Science and Engineering; SS=Social Sciences;**

**ACGH=American Cultures; DD=Domestic Diversity; OL=Oral Skills; QL=Quantitative; SL=Scientific; VL=Visual; WC=World Cultures; WE=Writing Experience**

**Pre-Fall 2011 General Education (GE): ArtHum=Arts and Humanities; SciEng=Science and Engineering; SocSci=Social Sciences; Div=Domestic Diversity; Wrt=Writing Experience**

**Quarter Offered:** F=Fall, W=Winter, S=Spring, Su=Summer; 2017-2018 offering in parentheses

**112. Fundamentals of Organization Management (4)**

Lecture—4 hours. Prerequisite: upper division standing or consent of instructor. Open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Role of organizational design and behavior in business and public agencies. Principles of planning, decision making, individual behavior, management, leadership, informal groups, conflict and change in the organization. GE credit: SocSci | SS.—F, W, S, Su. (F, W, S, Su.)

**113. Fundamentals of Marketing Management (4)**

Lecture—4 hours. Prerequisite: Economics 1A; for non-majors only. Nature of product marketing by the business firm. Customer-product relationships, pricing and demand; new product development and marketing strategy; promotion and advertising; product life cycles; the distribution system; manufacturing, wholesaling, retailing. Government regulation and restraints. Not open for credit to students who have completed course 136. Offered irregularly. GE credit: SocSci | SS.

**115A. Economic Development (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A and 1B. Major issues encountered in emerging from international poverty, problems of growth and structural change, human welfare, population growth and health, labor markets and internal migration. Important issues of policy concerning international trade and industrialization. (Same course as Economics 115A.) GE credit: SocSci, Div | SS, WC.—F, W, S. (F, W, S.)

**115B. Economic Development (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A and 1B. Macroeconomic issues of developing countries. Issues include problems in generating capital, conduct of monetary and fiscal policies, foreign aid and investment. Important issues of policy concerning international borrowing and external debt of developing countries. (Same course as Economics 115B.) GE credit: SocSci | SS, WC.—F, S. (F, S.)

**118. Tax Accounting (4)**

Lecture—4 hours. Prerequisite: Management 11A, 11B; course 18 recommended. Development and application of a framework to understand the tax effects of typical management decisions on both entities and their owners. Impacts that different methods of taxation have on business entities with emphasis on tax planning, using income and deduction strategies, retirement plans, and choice of business entity for tax minimization.

**119. Intermediate Managerial Accounting (4)**

Lecture—4 hours; extensive problem solving—8 hours. Prerequisite: Management 11A; 11B. Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Use of accounting information by managers in decision making, planning, directing and controlling operations. Focuses on managerial/cost accounting theory and practice. Covers costing systems, budgeting, and financial statement analysis. GE credit: SocSci | SS.—F, W, (F, W.)

**120. Agricultural Policy (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A. Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Analytical treatment of historical and current economic problems and governmental policies influencing American agriculture. Uses of economic theory to develop historical and conceptual understanding of the economics of agriculture; how public policy influences the nature and performance of American agriculture. GE credit: SocSci | ACGH, SS.—S. (S.)

**120S. Agricultural Policy (4)**

Lecture—4 hours. Prerequisite: course 100A or consent of instructor. Analytical treatment of historical and current economic problems and governmental policies influencing agriculture. Uses of economic theory to develop historical and conceptual understanding of the economics of agriculture; how public policy influences the nature and performance of agriculture. Taught in Australia under the supervision of a UC Davis faculty member. Not open for credit to students who have completed course 120. Offered irregularly. GE credit: SocSci | SS, WC.

**121. Economics of Agricultural Sustainability (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Sciences 15; Community and Regional Development 20; Economics 1A; Mathematics 12 or equivalent. Application of economic concepts to agro-environmental issues relevant to agricultural sustainability. Topics include market efficiency, production externalities, government policies, agricultural trade, product differentiation, all linked to sustainability issues. Case studies include biofuels, genetically modified foods and geographically differentiated products. GE credit: SocSci | SS.

**130. Agricultural Markets (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 106. Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Nature, function, organizational structure, and operation of agricultural markets; prices, costs, and margins; market information, regulation, and controls; cooperative marketing. GE credit: SocSci | SS.—F. (F.)

**132. Cooperative Business Enterprises (3)**

Lecture—3 hours. Prerequisite: Economics 1A. Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Study of cooperative business enterprise in the United States and elsewhere; economic theories of behavior, principles of operation, finance, decision-making, and taxation. Offered irregularly. GE credit: SocSci | SS.—W. (W.)

**135. Agribusiness Marketing Plan Development (2)**

Lecture/discussion—2 hours. Prerequisite: upper division standing. Fundamental components required to develop a marketing plan. Appreciation of the concept of a marketing plan, appropriate research required, including the use of library and Internet, survey and interview instruments, government documents, market analysis, business proposition, action planning, financial evaluation and monitoring. (P/ NP grading only.) GE credit: SS.

**136. Managerial Marketing (4)**

Lecture—4 hours. Prerequisite: course 100A; Statistics 103. Application of economic theory and statistics in the study of marketing. Marketing measurement and forecasting, market planning, market segmentation, determination of optimal product market mix, sales and cost analysis, conduct of marketing research, marketing models and systems. GE credit: SocSci | SS.—F, S, Su. (F, S, Su.)

**138. International Commodity and Resource Markets (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100B. Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Basic nature and scope of international trade in agricultural commodities, agricultural inputs, and natural resources. Market dimensions and policy institutions. Case studies to illustrate import and export problems associated with different regions and commodities. GE credit: SocSci | SS.—W. (W.)

**139. Futures and Options Markets (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A; Statistics 103. Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. History, mechanics, and economic functions of

futures and options markets; hedging; theory of inter-temporal price formation and behavior of futures and options prices; price forecasting; futures and options as policy tools. GE credit: SocSci | SS.—F, S. (F, S.)

**140. Farm Management (4)**

Lecture—4 hours. Prerequisite: Economics 1A. Pass One open to Managerial Economics majors. Farm organization and resources; economic and technological principles in decision making; analytical techniques and management control; problems in organizing and managing the farm business. GE credit: SocSci | SS.—W. (W.)

**142. Personal Finance (3)**

Lecture—3 hours. Prerequisite: Economics 1B. Management of income and expenditures by the household. Use of consumer credit, savings, and insurance by households. Principles of tax, retirement, and estate planning. GE credit: SocSci | SS.—F, S, Su. (F, Su.)

**143. Investments (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Survey of investment institutions, sources of investment information, and portfolio theory. Analysis of the stock, bond and real estate markets from the perspective of the investor. GE credit: SocSci | SS.—F, Su. (F, Su.)

**144. Real Estate Economics (3)**

Lecture—3 hours. Prerequisite: course 100A. The economic theory, analysis, and institutions of real estate markets and related financial markets. Case studies drawn from the raw land, single family, multi-family, industrial and office real estate markets. GE credit: SocSci | SS.—S. (S.)

**145. Farm and Rural Resources Appraisal (4)**

Lecture/discussion—4 hours. Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Principles, procedures, and practice of the valuation process with specific emphasis placed on farm real estate. Concepts of value, description of land, identification of the major physical and economic determinants of value, the three primary appraisal approaches to valuation, discussion of appraisal activity and practice. GE credit: SocSci | SS.—W. (W.)

**146. Business, Government Regulation, and Society (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100B. Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Variety, nature and impact of government regulation: anti-trust laws and economic and social regulation. Nature of the legislative process, promulgation of regulations, and their impact, especially as analyzed by economists. GE credit: SocSci | ACGH, SS.—S. (S.)

**147. Resource and Environmental Policy Analysis (3)**

Lecture—3 hours. Prerequisite: Economics 1A. Open to non-majors only. Natural resource use problems with emphasis on past and current policies and institutions affecting resource use; determinants, principles, and patterns of natural resource use; property rights; conservation; private and public resource use problems; and public issues. Students who have had or are taking course 100A, Economics 100, or the equivalent, may receive only 2 units of credit, so must enroll in course 147M instead. GE credit: SocSci | SS.—W. (W.)

**147M. Resource and Environmental Policy Analysis (2)**

Lecture—3 hours. Prerequisite: Economics 1A. Open to non-majors only. Natural resource use problems with emphasis on past and current policies and institutions affecting resource use; determinants, principles, and patterns of natural resource use; property

rights; conservation; private and public resource use problems; and public issues. Students who have had or are taking course 100A, Economics 100, or the equivalent, must enroll in this course for 2 units rather than course 147. GE credit: SocSci | SS. —W. (W.)

#### **150. Agricultural Labor (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A. Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Analysis of labor markets with focus on U.S. and world agriculture. Labor supply, demand, market equilibrium; why farm labor markets are different; global trends in farm labor; U.S. farm labor history; unions and collective bargaining; immigration policy. GE credit: SocSci, Div, Wrt | SS. —S. (S.)

#### **155. Operations Research and Management Science (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A; Statistics 103. Pass One open to Managerial Economics (AMGE) and Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Introduction to quantitative methods used to analyze business and economic processes: decision analysis for management, mathematical programming, competitive analysis, and other methods. GE credit: SocSci | SS, QL. —F, W, S, Su. (F, W, S, Su.)

#### **156. Introduction to Mathematical Economics (4)**

Lecture—4 hours. Prerequisite: courses 100B; 155. Pass One open to Managerial Economics (AMGE) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Linear algebra for economists; necessary and sufficient conditions in static optimization problems; implicit function theorem; economic methodology and mathematics; comparative statics; envelope theorem; Le Chatelier principle; applications to production and consumer models. Offered irregularly. GE credit: SocSci | QL, SS. —Su. (Su.)

#### **157. Analysis for Operations and Production Management (4)**

Lecture—4 hours. Prerequisite: course 155. Pass One open to Managerial Economics (AMGE), Animal Science and Management (AANM) Majors and Agricultural and Resource Economics (GARE) Graduate Majors. Application of economic theory and quantitative methods to analyze operations and production management problems including process strategy, quality management, location and plant layout, and inventory management. GE credit: SocSci | SS. —F, W. (F, W.)

#### **165. Emerging Economies and Globalization (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100A, 115A, 115B; completion of course 106 and Economics 162 strongly recommended. Pass One open to Managerial Economics and graduate majors. Economic drivers and policy challenges in the major emerging markets, with an emphasis on the effects of rising incomes, population growth, urbanization, and relative wages on world markets and natural resources. GE credit: SocSci | SS. —F. (F.)

#### **171A. Financial Management of the Firm (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 106; Management 11A-11B. Financial analysis at the firm level: methods of depreciation; influence of the tax structure; inventory, cash, and accounts receivable management; sources of short-term and long-term financing, and financial problem solving using a computer spreadsheet program. Not open for credit to students who have completed Economics 134. GE credit: SocSci | QL, SS. —F, W, Su. (F, W, Su.)

#### **171B. Financial Management of the Firm (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 171A. Financial analysis at the firm level: methods of capital budgeting; calculating the cost of

capital; dividend policies; mergers and acquisitions; and special current topics in finance. GE credit: SocSci | QL, SS. —W, S, Su. (W, S, Su.)

#### **175. Natural Resource Economics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100B or Economics 100 or the equivalent. Economic concepts and policy issues associated with natural resources, renewable resources, (ground water, forests, fisheries, and wildlife populations) and non-renewable resources (minerals and energy resources, soil). (Same course as Environmental Science and Policy 175.) GE credit: SocSci | SS. —S. (S.)

#### **176. Environmental Economics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100B or Economics 100. Role of the environment in economic activity and methods for protecting and enhancing environmental quality; implications of market failures for public policy; design of environmental policy; theory of welfare measurement; measuring the benefits of environmental improvement. GE credit: SocSci | SS. —W. (W.)

#### **190. Topics in Managerial Economics (3)**

Lecture—3 hours. Prerequisite: passing grades in course 100A and Statistics 103; consent of instructor. Selected topics in managerial economics, focusing on current research. May be repeated four times for credit when topic differs. Offered irregularly. GE credit: SocSci | SS.

#### **192. Internship (1-6)**

Internship—3-18 hours. Internship experience off and on campus in all subject areas offered in the Department of Agricultural and Resource Economics. Internships are supervised by a member of the staff. (P/NP grading only.) GE credit: SS.

#### **194HA. Special Study for Honors Students (4)**

Independent study—3 hours; seminar—1 hour. Prerequisite: minimum GPA of 3.500; course 100B, courses 106 and 155 (may be taken concurrently); major in Agricultural and Managerial Economics or Managerial Economics; senior standing; consent of instructor. A program of research culminating in the writing of a senior honors thesis under the direction of a faculty adviser. (Deferred grading only, pending completion of sequence.) GE credit: SocSci | QL, SS, WE.

#### **194HB. Special Study for Honors Students (4)**

Independent study—3 hours; seminar—1 hour. Prerequisite: minimum GPA of 3.500; course 100B; courses 106 and 155 (may be taken concurrently); major in Agricultural and Managerial Economics or Managerial Economics; senior standing. A program of research culminating in the writing of a senior honors thesis under the direction of a faculty adviser. (Deferred grading only, pending completion of sequence.) GE credit: SocSci | QL, SS, WE.

#### **197T. Tutoring in Managerial Economics (1-3)**

Prerequisite: senior standing in Managerial Economics and consent of Department Chairperson. Undergraduates assist the instructor by tutoring students in one of the department's regularly scheduled courses. (P/NP grading only.) GE credit: SS.

#### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) GE credit: SS.

#### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) GE credit: SS.

#### **Graduate**

#### **200A. Microeconomic Theory (5)**

Lecture—4 hours; discussion—1 hour. Prerequisite: graduate standing. Linear and non-linear optimization theory applied to develop the theory of the profit-maximizing firm and the utility-maximizing consumer. (Same course as Economics 200A.) —F. (F.)

#### **200B. Microeconomic Theory (5)**

Lecture—4 hours; discussion—1 hour. Prerequisite: course 200A. Characteristics of market equilibrium under perfect competition, simple monopoly and monopsony. Emphasis on general equilibrium and welfare economics; the sources of market success and market failures. (Same course as Economics 200B.) —W. (W.)

#### **200C. Microeconomic Theory (5)**

Lecture—4 hours; discussion—1 hour. Prerequisite: course 200B. Uncertainty and information economics. Individual decision making under uncertainty. Introduction to game theory, with emphasis on applications to markets with firms that are imperfect competitors or consumers that are imperfectly informed. (Same course as Economics 200C.) —S. (S.)

#### **202A. Introduction to Applied Research Methods (3)**

Lecture/discussion—3 hours. Prerequisite: courses 204A and 256, or the equivalent; course 200A concurrently. Study of philosophy and methodology of applied research in agricultural economics. Methods of conceptualization of researchable topics. Method of communication and constructive criticism. —F. (F.)

#### **202B. Applied Microeconomics I: Consumer and Producer Behavior (3)**

Lecture/discussion—3 hours. Prerequisite: courses 200A and 202A; course 200B concurrently. Application of consumer and producer theory in models of individual behavior and market-level phenomena. Implications of consumer and producer theory for specification of empirical models of supply and demand for inputs and outputs and market equilibrium displacement models. —W. (W.)

#### **202C. Research Design for Applied Microeconomics (3)**

Lecture/Discussion—3 hours. Prerequisite: courses 240A and 202B. Third of three courses in the Ph.D level applied microeconomics sequence. Examines the design of empirical research and the application of econometric theory. —S. (S.)

#### **204A. Microeconomic Analysis I (4)**

Lecture—4 hours. Prerequisite: course 100B or Economics 100; advanced undergraduates with consent of instructor. Behavior of consumers and producers and their interactions; tools and methods needed to analyze economic behavior in the marketplace. Application of those methods to real-world problems. —F. (F.)

#### **204B. Microeconomic Analysis II (4)**

Lecture—4 hours. Prerequisite: course 204A or consent of instructor. Behavior in imperfectly competitive markets-monopoly and price discrimination; oligopoly. Introduction to noncooperative game theory. Analysis of decisions made under risk and uncertainty and imperfect information. The economics of externalities and public goods. —W. (W.)

#### **214. Development Economics (4)**

Lecture—4 hours. Prerequisite: course 100A, 100B, Economics 101; course 204A and Economics 160A, 160B recommended. Review of the principal theoretical and empirical issues whose analysis has formed development economics. Analysis of economic development theories and development strategies and their application to specific policy issues in developing country contexts. (Same course as Economics 214.) —S. (S.)

#### **215A. Microdevelopment Theory and Methods I (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A or 204A; course 240A recommended. Agricultural development theory, with a focus on microeconomics. Agricultural household behavior with and without imperfections and uncertainty. Analysis of rural land, labor, credit and insurance markets, institutions, and contracts. (Same course as Economics 215A.) —F. (F.)

#### **215B. Open Macroeconomics of Development (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 200A or 204A; 200D or 205, and 214 or 215A. Models and policy approaches regarding

trade, monetary and fiscal issues, capital flows and debt are discussed in the macroeconomic framework of an open developing country. The basic analytical focus is real exchange rate and its impact on sectoral allocation of resources. (Same course as Economics 215B.)—W. (W.)

### **215C. Microdevelopment Theory and Methods II (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 215A. Extension of development theory and microeconomic methods. Agricultural growth and technological change; poverty and income inequality; multisectoral, including village and regional models. Computable general equilibrium methods and applications. (Same course as Economics 215C.)—S. (S.)

### **215D. Environment and Economic Development (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A, 204A or 275. Interdisciplinary course drawing on theoretical and empirical research on interactions between environmental resource use and economic development processes. Analysis of issues emerging at the interface of environmental and development economics. (Same course as Economics 215D.)—S. (S.)

### **222. International Agricultural Trade and Policy (4)**

Lecture—4 hours. Prerequisite: course 100B or 204A; Economics 160A or the equivalent. Analysis of country interdependence through world agricultural markets. Partial equilibrium analysis is used to study the impacts of national intervention on world markets, national policy choice in an open economy and multinational policy issues. —F. (F.)

### **223. Economics of Agriculture (4)**

Lecture—4 hours. Prerequisite: courses 204A and 256A or equivalent completed or concurrent required. Open to MS students in Agricultural and Resource Economics, Ph.D. students in Agricultural and Resource Economics and qualified students from other UC Davis graduate groups/programs. Analytic treatment of the historical development and contemporary role of agriculture in the global, U.S. and California economies. Uses economic reasoning and evidence to develop historical and conceptual understanding of the economics of agriculture, agricultural issues, and related government policies. —F. (F.) Alston

### **231. Supply and Demand for Agricultural Products (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 200A, 202A, and 240A or consent of instructor. Analysis of supply and demand for agricultural commodities emphasizing the effective use of microeconomic theory with econometric methods, and other empirical procedures, in conducting applied analysis of supply and demand at the firm and industry level. —F. (F.)

### **232. Agricultural Commodity Markets (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 200A, 202A, and 240A or consent of instructor. Economic analysis of industries that produce, market, transport, store, and process basic commodities. Analysis of market equilibrium under perfect and imperfect competition, with and without government involvement. —W. (W.)

### **233. Agricultural Policy (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 200A, 202A, and 240A or consent of instructor. Nature, formation, evolution, and institutions of economic policy applied to food, agricultural, and rural issues. Examples for detailed consideration include food security, commodity issues, and trade policy. Analytical approaches include static and dynamic welfare analysis, policy design, and political-economic analysis. —S. (S.)

### **239. Econometric Foundations (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing or consent of instructor. The course will prepare students for econometric theory and empirical work by examining the statistical foun-

dation of econometrics. Special attention is paid to problems specific to non-experimental data common to social sciences. Topics from matrix algebra are also covered. (Same course as Economics 239.)—F. (F.)

### **240A. Econometric Methods (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 133 and a course in linear algebra or the equivalent. Least squares, instrumental variables, and maximum likelihood estimation and inference for single equation linear regression model; linear restrictions; heteroskedasticity; autocorrelation; lagged dependent variables. (Same course as Economics 240A.)—W. (W.)

### **240B. Econometric Methods (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 240A. Topics include asymptotic theory and instrumental variables, pooled time-series cross-section estimation, seemingly unrelated regression, classical hypothesis tests, identification and estimation of simultaneous equation models, cointegration, error-correction models, and qualitative and limited dependent variable models. (Same course as Economics 240B.)—S. (S.)

### **240C. Time Series Econometrics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B or consent of instructor. Probability theory; estimation, inference and forecasting of time series models; trends and non-standard asymptotic theory; vector time series methods and cointegration; time series models for higher order moments and transition data; state-space modeling; the Kalman filter. (Same course as Economics 240C)—W. (W.)

### **240D. Cross Section Econometrics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B or consent of instructor. Estimation and inference for nonlinear regression models for cross-section data; models for discrete data and for limited dependent variables; models for panel data; additional topics such as bootstrap and semiparametric regression. (Same course as Economics 240D)—F. (F.)

### **240E. Topics in Time Series Econometrics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 240C or consent of instructor. Modern econometric techniques for time series data. Expand on topics covered in Economics 240A, 240B and 240C. Contents may vary from year to year. (Same course as Economics 240E.)—S. (S.)

### **240F. Topics in Cross Section Econometrics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 240D or consent of instructor. Modern econometrics techniques for cross-section data. Expand on topics covered in Economics 240A, 240B and 240D. Contents may vary from year to year. (Same course as Economics 240F.)—S. (S.)

### **252. Optimization with Economic Applications (4)**

Lecture—3 hours; discussion—1 hour. Applied linear programming methods emphasizing uses for business decisions: production, diet, blending, network and related problems. —W. (W.)

### **254. Dynamic Optimization Techniques with Economic Applications (4)**

Lecture—4 hours. Prerequisite: course 253 and elementary knowledge of ordinary differential equations. Necessary and sufficient conditions in the calculus of variations and optimal control, economic interpretations, the dynamic envelope theorem and transversality conditions, infinite horizon problems and phase diagrams, local stability and comparative statics of the steady state, comparative dynamics. —F. (F.)

### **255. Applied Dynamic Structural Econometric Modeling (4)**

Lecture—4 hours. Prerequisite: course 254. Course covers structural econometric models of static games of incomplete information, single-agent dynamic optimization problems and multi-agent dynamic

games, with a focus on applications to issues relevant to the environment, energy, natural resources, agriculture, and development. —W. (W.)

### **256A. Applied Econometrics I (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 106 or Economics 140; or consent of instructor. First of two courses in the Masters-level econometrics sequence. The linear regression model and generalizations are applied to topics in agricultural and resource economics. Tools for empirical research for problems requiring more sophisticated tools than standard regression models are emphasized. —F. (F.)

### **256B. Applied Econometrics II (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 256A or consent of instructor. Second of two courses in the Masters-level econometrics sequence. The linear regression model and generalizations are applied to topics in agricultural and resource economics. Tools for empirical research for problems requiring more sophisticated tools than standard regression models are emphasized. Offered in alternate years. —(W.)

### **258. Demand and Market Analysis (4)**

Lecture—4 hours. Prerequisite: courses 204B and 256 or consent of instructor. Application of theoretical material covered in 204A/B, with particular focus on production theory/factor demand and imperfect competition/market power. Use of theoretical models as a foundation for empirical economic analysis, and empirical exercises. Independent research on chosen topics, with empirical application. —S. (S.)

### **275. Economic Analysis of Resource and Environmental Policies (4)**

Lecture/discussion—4 hours. Prerequisite: course 204A. Development of externality theory, market failure concepts, welfare economics, theory of renewable and non-renewable resource use, and political economic models. Applications to policy issues regarding the agricultural/environment interface and managing resources in the public domain. (Same course as Environmental Science and Policy 275.)—S. (S.)

### **276A. Environmental Economics: Externalities (4)**

Lecture—4 hours. Prerequisite: students should have completed the first year graduate-level sequence in microeconomics and econometrics. Course introduces fundamental and recent research in environmental economics, focusing on the design, implementation and evaluation of environmental policy instruments to correct market failures. It will expose students to economic theories and empirical techniques frequently used in this field. —W. (W.)

### **276B. Environmental Economics: Non-Market Valuation (4)**

Lecture—4 hours. Prerequisite: students should have completed the first year graduate-level sequence in microeconomics and econometrics. Second PhD field course in environmental economics, covering theory and econometrics of methods for valuing non-market goods and environmental quality changes. Topics include revealed preference (travel cost, hedonics, sorting equilibrium) and stated preference (contingent valuation, choice experiments, conjoint analysis) techniques. —S. (S.)

### **277. Natural Resource Economics (4)**

Lecture—4 hours. Prerequisite: course 254 or consent of instructor. Application of capital theory and dynamic methods to issues of optimal use of renewable and nonrenewable resources. Examination of policy issues associated with forests, fisheries, groundwater, energy resources, watersheds, soil, global climate, and wildlife. —S. (S.)

### **290. Topics in Agricultural and Resource Economics (3)**

Lecture—3 hours. Selected topics in agricultural and resource economics, focusing on current research. May be repeated 4 times for credit. Offered irregularly.

**293. Analysis of California Agriculture and Resources (3)**

Lecture—1.5 hours; fieldwork—45 hours total, including one 5-day summer field trip. Review and analysis of production, marketing, and resource issues facing agricultural firms in California. Application of economic theory and measurement to individual firm and industry decisions in an applied setting. (S/U grading only.)—F. (F.)

**298. Directed Group Study (1-5)**

Advanced study through special seminars, informal group studies, or group research on problems for analysis and experimentation. Sections: (1) Managerial Economics; (2) Agricultural Policy; (3) Community and Regional Development; (4) Natural Resources; (5) Human Resources; (6) Research Methods and Quantitative Analysis.

**299. Individual Study (1-12)**

Sections: (1) Managerial Economics; (2) Agricultural Policy; (3) Community and Regional Development; (4) Natural Resources; (5) Human Resources; (6) Research Methods and Quantitative Analysis; and (7) Dissertation Research Prospectus. (S/U grading only.)

**299D. Special Study for Doctoral Dissertation (1-12)**

(S/U grading only.)

**Professional****396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## Agricultural Computing and Information Systems

See Applied Computing and Information Systems, on page 175.

## Agricultural Management and Rangeland Resources

(College of Agricultural and Environmental Sciences)

This major was discontinued as of Fall 2008; see Ecological Management and Restoration, on page 250.

**Faculty.** See Plant Sciences, on page 514.

**Courses.** See Plant Sciences, on page 514.

## Agricultural Systems and Environment

(College of Agricultural and Environmental Science)

**Minor Program Requirements:**

UNITS

**Agricultural Systems and Environment.....**

18-20

**Preparatory material:** Course in statistics such as Statistics 13, 32, 100, Plant Sciences 120, Sociology 46B or equivalent. Course in plant science such as Plant Sciences 2, completion of Biological Sciences 2A and 2B and 2C also fulfills this requirement.

Select one of the two following tracks:

Sustainable Agriculture track	
Plant Sciences 150 .....	4
Soil Science 100 .....	5
Plant Sciences 105 or 176 or Entomology 110.....	3-5
Minimum of six units from the following:	
Plant Sciences 110A, 110C, 110L, 112, 113, 114 170A, 170B .....	6
Range and Natural Resources track	
Plant Sciences 130 .....	3
Minimum of 15 units from the following:	
Plant Sciences 112, 131, 135, 150, 163, Environmental Science and Policy 123, 172, Wildlife, Fish and Conservation Biology 110, 151	

**Minor Advisers.** T. Gradziel (*Plant Sciences*)

**Advising Center** is located in 1220 Plant and Environmental Sciences 530-752-1715.

## Agronomy

See Plant Sciences, on page 514.

## Agronomy and Range Science

See Plant Sciences, on page 514.

## American Studies

(College of Letters and Science)

**Department Office.** 2134A Hart Hall  
530-752-6429; <http://ams.ucdavis.edu>

**Faculty**

Javier Arbona, Ph.D., Post Doctoral Scholar  
Charlotte Biltekoff, Ph.D., Associate Professor  
Ryan Cartwright, Assistant Professor  
Caren Kaplan, Ph.D., Professor  
Eric Smoodin, Ph.D., Professor  
Julie Sze, Ph.D., Professor  
Carolyn Thomas, Ph.D., Professor  
Grace Wang, Ph.D., Associate Professor

**Emeriti Faculty**

Jay Mechling, Ph.D., Professor Emeritus  
*Academic Senate Distinguished Teaching Award*  
Michael L. Smith, Ph.D., Senior Lecturer Emeritus  
David Scofield Wilson, Ph.D., Senior Lecturer  
Emeritus

**The Major Program**

American Studies explores the cultures of the United States, as well as their transnational exchanges and impact. The discipline's practitioners seek to understand the historical origins of particular cultures and practices held by individuals and groups within the United States and how those values and beliefs shape social and political realities within and beyond U.S. borders. The approach that American Studies takes is interdisciplinary, meaning that in American Studies we answer these questions using tools developed by numerous disciplines including history, sociology, anthropology, literary criticism, folklore, media and science and technology studies. American Studies takes as its subject American cultures and provides an excellent, broad education in the liberal arts. Our aim is to make each student a culture critic, a person capable of bringing a thoughtful and humane approach to bear upon our understanding of the varieties of American experiences. Making connections is the way we like to characterize our work in American Studies. American Studies majors are good critical thinkers, develop excellent writing skills, and most importantly "learn how to learn," that is, you learn to figure out

what intellectual tools and specialized knowledge you will need to perform a task or solve a problem. These intellectual and communication skills will prepare majors for a broad array of careers.

**The Program.** American Studies majors take five upper division courses devoted to close study of major issues crucial to the practice of American Studies. Advanced work in at least two other departments or programs allows each student to areas tailored to his or her own individual education goals. Sample emphases include: Culture and Consumption, Youth Education, Social Identities, Nature, Culture and Environment, Marketing, Advertising and Business, and Food and Health, for example. Students have the option of writing a senior thesis within this emphasis.

**Career Alternatives.** As an interdisciplinary program, American Studies provides a good liberal arts and sciences undergraduate education. American Studies maximizes a student's contact with a variety of subject matter and approaches. Graduates have moved into a broad range of career settings, including journalism, law, teaching, marketing, non-profit and community organizations, government, social work, environmental planning, library science, museum curatorship, and business. Students discover new career possibilities through their internships in American institutions.

**A.B. Major Requirements:**

	UNITS
<b>Preparatory Subject Matter .....</b>	<b>24</b>
American Studies 10 .....	4
One additional lower division American Studies course.....	4
One course from: African American and African Studies 10, Asian American Studies 1, Chicana/o Studies 10, Native American Studies 1, or an equivalent course in racial and ethnic diversity .....	4
One course from: Anthropology 2, Sociology 2, Women's Studies 50, or an equivalent course in social science approaches to culture.....	4
One course from: History 17A, 17B, 72A, 72B.....	4
One course from: English 30A, 30B, Film Studies 1, or an equivalent course introducing critical approaches to literary and visual texts in the humanities .....	4
<b>Depth Subject Matter.....</b>	<b>40</b>
American Studies 100 and 160.....	8
American Studies Electives: Three additional upper-division American Studies courses .....	12
Emphasis.....	20
In consultation with the American Studies Undergraduate Adviser, the student designs a program of 20 units (typically five courses) of upper division course work around a unifying theme, period, or subject matter in American cultures. The courses should come from two or more departments or programs and can include up to 8 units of American Studies courses. Only 4 units of course 192 (internship) can be included in the emphasis. The student may choose the senior thesis option (190A-190B) for 8 units of the emphasis and take the remaining 12 units outside the program.	
<b>Total Units for the Major .....</b>	<b>64</b>

**Recommended**

Completion of the college requirement in English composition before enrollment in American Studies 190A.

**Minor Program Requirements:**

	UNITS
<b>American Studies .....</b>	<b>20</b>
American Studies, upper division courses .....	20
No more than 8 units of course 192 may be counted toward this total.	

Fall 2011 and on Revised General Education (GE): AH=Arts and Humanities; SE=Science and Engineering; SS=Social Sciences;

ACGH=American Cultures; DD=Domestic Diversity; OL=Oral Skills; QL=Quantitative; SL=Scientific; VL=Visual; WC=World Cultures; WE=Writing Experience

Pre-Fall 2011 General Education (GE): ArtHum=Arts and Humanities; SciEng=Science and Engineering; SocSci=Social Sciences; Div=Domestic Diversity; Wrt=Writing Experience  
Quarter Offered: F=Fall, W=Winter, S=Spring, Su=Summer; 2017-2018 offering in parentheses

**Faculty Advisers.** J. Arbona, C. Biltkoff, C. Kaplan, A. Nath, E. Smoodin, J. Sze, G. Wang

## Courses in American Studies (AMS)

### Lower Division

#### 1A. Science and American Culture (4)

Lecture—3 hours; discussion—1 hour. American science as a cultural system. Mutual influence and interaction of that system with other cultural systems including religion, social thought, art, architecture, literature, music, and common sense. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, DD, WE.—F.

#### 1B. Religion in American Lives (4)

Lecture—3 hours; discussion—1 hour. Religious and spiritual practices in the United States, and their interrelationships with other aspects of U.S. history, society and culture; indigenous and imported faiths, and the impact of immigration, colonization and culture contact on religious systems. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.—F. (F.)

#### 1C. American Lives Through Autobiography (4)

Lecture—3 hours; discussion—1 hour. American culture as understood through the individual life stories told by Americans, with attention to the roles of gender, race, ethnicity, social class, and sexual orientation in the individual's life course. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.—W.

#### 1E. Nature and Culture in America (4)

Lecture—3 hours; discussion—1 hour. Uses and abuses of nature in America; patterns of inhabitation, exploitation, appreciation, and neglect; attention to California; emphasis on metaphor as a key to understanding ourselves and the natural world; attention to models of healing: stewardship, ecology, the "rights" movement. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.—S. Cartwright

#### 4. Freshman Seminar (2)

Seminar—2 hours. Prerequisite: open only to students who have completed fewer than 40 quarter units. Class size limited to 25 students. Investigation of a special topic in American Studies through shared readings, discussions, written assignments, and special activities (such as fieldwork, site visits). Emphasis on student participation in learning.—F, S. (F, S.)

#### 5. Technology in American Lives (4)

Lecture—2 hours; discussion—2 hours. Technology as both a material cultural force and a symbol in American culture; the lives of engineers at work and play; images of the engineer and technology in popular culture; social political and ethical issues raised by technology. Offered irregularly. GE credit: ArtHum or SocSci, Wrt | AH or SS, WE.—F. (F.)

#### 10. Introduction to American Studies (4)

Lecture—3 hours; discussion—1 hour. United States history, culture and society. Examination of cultural objects and social practices. Topics include popular culture (film, TV, Internet), cultural diversity, social activism, play, and communication. GE credit: GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.—S. Wang, Sze

#### 21. Objects and Everyday Life (4)

Lecture—3 hours; discussion—1 hour; term paper. Material culture (objects and artifacts ranging from everyday objects like toys and furnishings to buildings and constructed landscapes) as evidence for understanding the everyday (vernacular) lives (gender, social class, ethnicity, region, age, and other factors; collecting and displaying material. Offered in alternate years. GE credit: ArtHum, Div, Wrt | ACGH, AH, DD, WE.—S. Kaplan

#### 25. United States as a Business Culture (4)

Lecture—3 hours; discussion—1 hour. Business as a cultural system and its relation to religion, politics, arts, science, technology, and material culture; business themes of success, creativity, invention, and competition in American autobiographies, fiction, advice literature, film, and television; cultures of the

workplace; multinational business. Offered irregularly. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.—F. (F.)

#### 30. Images of America and Americans in Popular Culture (4)

Lecture—3 hours; discussion—1 hour. Investigation of verbal and visual discourses about American identity in various popular culture products, including film, television, radio, music, fiction, art, advertising, and commercial experiences; discourses about the United States in the popular culture of other societies. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.—(F.) Kaplan, Smoodin

#### 55. Food in American Culture (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: complete Subject A requirement. Food as a cultural system in the United States; food in the performance of individual and group identity, including gender and ethnicity; food in literature, art, popular culture (film, television, advertising), and folk culture; the food industry and business. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.—S. (S.) Biltkoff

#### 59. Music and American Culture (4)

Lecture—3 hours; discussion—1 hour. An examination of music and American culture. Studies will explore music in its cultural contexts, which may include examinations of recording and broadcasting, of race, class, and gender, the role of technology, and relationships between musical production, consumption and listening. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.—F. (F.)

#### 95. Careers and Identity in American Culture (2)

Lecture—1 hour; discussion—1 hour. Defining one's identity through the career. The life course, preparation, and choices. Personality and career. Ethics. Gender, ethnicity, sexuality, and social class in the workplace. The transnational workplace. Conflicts between the career and other social roles.—F, W, S, Su. (F, W, S, Su.)

#### 98. Directed Group Study (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

#### 99. Individual Study for Undergraduates (1-5)

(P/NP grading only.)

### Upper Division

#### 100. Methods in American Studies (4)

Lecture/discussion—3 hours; term paper. Design and implementation of interdisciplinary research, analysis and writing for American Studies and other cultural studies fields. Library and Internet research skills, project/problem definition, methods for study of texts, individuals, communities. Hand-on, skill-building, focused reading, discussion.

#### 101A. Special Topics: Popular Culture Studies (4)

Seminar—3 hours. Intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. May be repeated for credit in different subject area only.

#### 101B. Special Topics: Women's Studies (4)

Seminar—3 hours. Intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. May be repeated for credit in different subject area only.)

#### 101C. Special Topics: Material Aspects of American Culture (4)

Seminar—3 hours. Intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. May be repeated for credit in different subject area only.

#### 101D. Special Topics: American National Character (4)

Seminar—3 hours. Intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. May be repeated for credit in different subject area only.

#### 101E. Special Topics: American Lives Through Autobiography (4)

Seminar—3 hours. Intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. May be repeated for credit in different subject area only.

#### 101F. Special Topics: Interrelationship Between Arts and Ideas (4)

Seminar—3 hours. Intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. May be repeated for credit in different subject area only.

#### 101G. Special Topics: New Directions in American Culture Studies (4)

Seminar—3 hours. Intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. May be repeated for credit in different subject area only.

#### 101H. Special Topics: Problems in Cross-Cultural American Studies (4)

Seminar—3 hours. Intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. May be repeated for credit in different subject area only.

#### 110. A Decade in American Civilization (4)

Lecture—2 hours; discussion—2 hours. Close examination of a single decade in American civilization; the connections between the history, literature, arts, customs, and ideas of Americans living in the decade. Issues and representations of race, class, gender, age, and sexuality in the decade. May be repeated for credit if decades studied are different. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.

#### 120. American Folklore and Folklife (4)

Lecture—3 hours; fieldwork—1 hour. Theory and method of the study of American folk traditions, including oral lore, customs, music, and material folk culture; the uses and meanings of those traditions in various folk communities, including families, ethnic institutions, voluntary organizations, and occupational groups. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.

#### 125. Corporate Cultures (4)

Lecture—2 hours; discussion—1 hour; fieldwork—1 hour. Prerequisite: consent of instructor. Exploration of the small group cultures of American corporate workplaces, including the role of environment, stories, jokes, rituals, ceremonies, personal style, and play. The effects of cultural diversity upon corporate cultures, both from within and in contact with foreign corporations.—S. (S.)

#### 130. American Popular Culture (4)

Lecture/discussion—3 hours; fieldwork—1 hour. American popular expression and experience as a cultural system, and the relationship between this system and elite and folk cultures. Exploration of theories and methods for discovering and interpreting patterns of meaning in American popular culture. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.

#### 139. Feminist Cultural Studies (4)

Lecture/discussion—4 hours. The histories, theories, and practices of feminist traditions within cultural studies. (Same course as Women's Studies 139.) Offered irregularly. GE credit: SocSci, Div, Wrt | ACGH, AH, DD, SS, VL, WE.

#### 151. American Landscapes and Places (4)

Lecture—2 hours; discussion—1 hour; fieldwork—3 hours. Comparative study of several American cultural populations inhabiting a region, including their

relationship to a shared biological, physical, and social environment, their intercultural relations, and their relationships to the dominant American popular and elite culture and folk traditions. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE. —W. (W.)

#### **152. The Lives of Children in America (4)**

Lecture—2 hours; discussion—2 hours. Experience of childhood and adolescence in American culture, as understood through historical, literary, artistic, and social scientific approaches. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE. —S. (S.) Smoodin

#### **153. The Individual and Community in America (4)**

Lecture—2 hours; discussion—2 hours. Interdisciplinary examination of past and present tensions between the individual and the community in American experience, as those tensions are expressed in such cultural systems as folklore, public ritual, popular entertainment, literature, fine arts, architecture, and social thought. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.

#### **154. The Lives of Men in America (4)**

Lecture—2 hours; discussion—2 hours. Interdisciplinary examination of the lives of boys and men in America, toward understanding cultural definitions of masculinity, the ways individuals have accepted or resisted these definitions, and the broader consequences of the struggle over the social construction of gender. Offered irregularly. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.

#### **155. Eating in America (4)**

Lecture—3 hours; fieldwork. Prerequisite: course 1. Interdisciplinary examination of the culture of food in America. Exploration of eating as a richly symbolic event integral to how Americans express and negotiate values, politics and identity. Offered irregularly. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE. —S. (S.) Biltzoff

#### **156. Race, Culture and Society in the United States (4)**

Lecture—2 hours; discussion—2 hours. Interdisciplinary examination of the significance of race in the making of America; how race shapes culture, identities and social processes in the United States; the interweaving of race with gender, class and nationhood in self and community. Offered irregularly. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE. —W. (W.)

#### **157. Animals in American Culture (4)**

Lecture—3 hours, discussion—1 hour. Animals as symbols in American thought, as found in folklore, popular culture, literature, and art; customs and stories around human-animal interactions, including hunting, religion, foodways, pets, zoos, circuses, rodeos, theme parks, and scientific research on animals. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE. —W.

#### **158. Technology and the Modern American Body (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: Technocultural Studies 1 and either course 1A or 5. The history and analysis of the relationships between human bodies and technologies in modern society. Dominant and eccentric examples of how human bodies and technologies influence one another and reveal underlying cultural assumptions. (Same course as Technocultural Studies 158.) GE credit: GE credit: ArtHum | ACGH, AH, WE.

#### **160. Undergraduate Seminar in American Studies (4)**

Seminar—3 hours; term paper. Prerequisite: open to junior and senior American Studies majors only. Limited enrollment. Intensive reading, discussion, research, and writing by small groups in selected topics of American Studies scholarship; emphasis on

theory and its application to American material. May be repeated one time for credit when content differs. —F, S. (F, S.)

#### **190A. Senior Thesis Research Seminar (4)**

Seminar—2 hours; extensive writing. Research and prospectus writing for senior thesis. —F. (F.)

#### **190B. Senior Thesis (4)**

Independent study—12 hours. Prerequisite: course 190A; consent of instructor. In consultation with adviser, student writes an extended research paper on a topic proposed in course 190A.—F, W, S. (F, W, S.)

#### **192. Internship in American Institutions (1-12)**

Internship—1-12 hours. Prerequisite: enrollment dependent on availability of intern positions, with priority to American Studies majors. Supervised internship and study within and about key organizations in American civilization at archives, museums, schools, historical societies, governmental and social agencies, etc., with attention to the techniques of participant observation and the collection of ethnographical data. May be repeated for credit for a total of 12 units. (P/NP grading only.)

#### **197T. Tutoring in American Studies (1-5)**

Tutorial—1-5 hours. Prerequisite: consent of Chairperson of American Studies Program. Tutoring in lower division American Studies courses, usually in small discussion groups. Periodic meetings with the instructor in charge; reports and readings. May be repeated for credit when the tutoring is for a different course. (P/NP grading only.)

#### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

#### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor and chairperson of American Studies Program. (P/NP grading only.)

#### **Graduate**

#### **220. American Folklore and Folklife (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Theory and methods for the study of the folklore and the folk customary behavior of Americans; contributions of folklore studies to scholarship in humanities and social science disciplines. —S. (S.) Turner

#### **250. Cultural Study of Masculinities (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Interdisciplinary approaches to understanding the social and cultural construction of masculinities; attention to the effects of biology, gender, race, class, sexual and national identities; criticism of oral, printed, visual, and mass mediated texts, and of social relations and structures. (Same course as Women's Studies 250.) —W.

#### **255. Food in American Culture (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Graduate standing or advanced undergraduate with consent of instructor. Interdisciplinary theories and methods for the study of food in American culture; food studies in relation to issues of identity (age, gender, ethnicity, religion, region, etc.), social relations, systems of production, and cultures of consumption. Offered irregularly. —W. (W.)

#### **298. Group Study (1-5)**

(S/U grading only.)

#### **299. Individual Study (1-12)**

Prerequisite: consent of instructor. (S/U grading only.)

#### **Professional**

#### **396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.) —F, W, S. (F, W, S.)

## **Anatomy**

See **Anatomy, Physiology and Cell Biology, on page 159; and Courses in Cell Biology and Human Anatomy (CHA), on page 432.**

## **Anatomy, Physiology and Cell Biology**

See **Veterinary Medicine, School of, on page 581.**

## **Anesthesiology and Pain Medicine**

See **Medicine, School of, on page 427.**

## **Animal Behavior (A Graduate Group)**

Andrew Sih, Ph.D., Chairperson of the Group

**Group Office.** 227D Life Sciences  
530-752-2981; Fax 530-752-8822;  
[animalbehavior@biosci.ucdavis.edu/](mailto:animalbehavior@biosci.ucdavis.edu)  
<http://anb.ucdavis.edu/>

**Faculty.** The Group includes faculty from 12 departments in five schools and colleges.

**Graduate Study.** The Ph.D. program in Animal Behavior is an interdepartmental program focusing on the mechanisms underlying and evolution of behavior, and applications of animal behavior to current problems in conservation biology and animal welfare. The program trains students for teaching and research in a variety of areas, including anthropology, animal science, ecology, entomology, neurobiology, psychology, physiology, veterinary science, wildlife biology, and zoology. Resources available to students, in addition to various departmental facilities, include those of the California National Primate Research Center, Bodega Marine Laboratory, and the UC Natural Reserve System.

There is an application deadline of Dec 1 for fall quarter.

**Preparation.** Appropriate preparation is a bachelor's or master's degree in a discipline relevant to the biology of behavior. In addition, at least one course from each of the following areas must be taken before admission into the program or before the end of the first year in the program.

**Ecology:** e.g., Evolution and Ecology 101, Environmental Science and Policy 100

**Genetics:** e.g., Biological Sciences 101

**Statistics:** e.g., Statistics 102 or Psychology 103

**Evolution:** e.g., Evolution and Ecology 100

**Animal behavior:** Neurobiology, Physiology, and Behavior 102

**Physiology:** e.g. Neurobiology, Physiology, and Behavior 101

**Core Requirements.** Students take two "breadth" courses, at least one course in statistics, a methodology and grant writing course, and a graduate seminar. Required courses:

**Fundamentals of Animal Behavior:** Animal Behavior 218A and 218B

**Methodology and Grant Writing:** Animal Behavior 201

**Advanced Statistics:** Psychology 204A, 204B, 204C, or 204D; Statistics 106, 108, 138, 205; Agronomy 204, 206

**Graduate Seminars:** Animal Behavior 290  
**Strongly recommended:** a course on teaching science: Biological Sciences 310, Psychology 390A, 390B

**Electives:** Students also take two additional courses (of at least 3 units each) in the student's area of specialization, chosen in consultation with and approved by the Course Guidance Committee.

**Strongly recommended:** at least one additional course in statistics or modeling. In addition to the above listed courses, modeling courses include Population Biology 231 and Psychology 120.

## Courses in Animal Behavior (ANB)

### Graduate

#### 201. Scientific Approaches to Animal Behavior Research (3)

Lecture—3 hours. Prerequisite: consent of instructor. Philosophical issues, goals, strategies and tools in field and laboratory research. May be repeated for credit when topics differ. —S. (S.)

#### 203. Advanced Animal Welfare (3)

Lecture—3 hours. Prerequisite: Animal Science 103 or equivalent course. Advanced animal welfare. Key concepts used when evaluating and understanding the welfare of animals kept by humans. Topics include animal pain, stress, cognition, motivation and emotions. Critical discussion of primary literature. May be repeated one time for credit. Offered in alternate years. —S. (S.) Tucker

#### 210. History of Animal Behavior (1)

Discussion—1 hour. Prerequisite: consent of instructor. Classic, seminal papers in animal behavior. Discussion of readings and broader historical context in which papers were written. (S/U grading only.)

#### 218A. Fundamentals of Animal Behavior (5)

Lecture/discussion—4 hours; discussion—1 hour. Prerequisite: consent of instructor; upper-division undergraduate introduction to the biology of behavior, such as Psychology 101, 122, 123, Neurobiology, Physiology, and Behavior 102, 150, 152, Wildlife, Fish, and Conservation Biology 141, Entomology 104, or Animal Science 105. Survey of the phenomena and theory of animal behavior from the perspectives of multiple biological disciplines, including evolution, ecology, psychology, genetics, neurobiology, endocrinology, and animal science. (Same course as Psychology 218A.) —F. (F.) Schank

#### 218B. Fundamentals of Animal Behavior (5)

Lecture/discussion—4 hours; discussion—1 hour. Prerequisite: consent of instructor; course 218A or Psychology 218A. Survey of the phenomena and theory of animal behavior from the perspectives of multiple biological disciplines, including evolution, ecology, psychology, genetics, neurobiology, endocrinology, and animal science. (Same course as Psychology 218B.) —W. (W.) Sih

#### 221. Animal Behavior, Ecology and Evolution (3)

Lecture—3 hours. Prerequisite: Neurobiology, Physiology, and Behavior 102, Evolution and Ecology 100, 101 or the equivalent, graduate standing, and consent of instructor. Interface between animal behavior, ecology and evolution. New developments in behavioral ecology and development and testing of hypotheses in this discipline. (Same course as Animal Behavior 221.) Offered irregularly.

#### 230A. Interdisciplinary Approaches to Animal Behavior (3)

Seminar—3 hours; term paper. Prerequisite: consent of instructor. Analysis of literature in behavior and an allied discipline or disciplines that offer the potential, in combination, to advance the understanding of a topic in animal behavior conceptually and empirically. Topics will vary from year to year.

#### 230B. Interdisciplinary Approaches to Animal Behavior (5)

Workshop—4 days total; discussion—3 hours; term paper. Prerequisite: course 230A the previous quarter. Development of an empirical or theoretical interdisciplinary approach to research on a current topic in animal behavior.

#### 270. Research Conference in Behavioral Ecology (1)

Conference—1 hour. Prerequisite: graduate standing and consent of instructor. Limited enrollment. Critical presentation and evaluation of current literature and ongoing research in behavioral ecology. May be repeated for credit. (S/U grading only.)

#### 287. Advanced Animal Behavior (2)

Seminar—2 hours. Prerequisite: graduate standing and consent of instructor, courses in animal behavior (Neurobiology, Physiology, and Behavior 102 or the equivalent), and either evolution (Evolution and Ecology 100 or the equivalent) or ecology (Evolution and Ecology 101 or the equivalent). Reading, reports and discussion on current topics in animal behavior, with a focus on topics that lie at the interface between animal behavior, ecology and evolution. (Same course as Population Biology 287.) May be repeated two times for credit.

#### 290. Seminar in Animal Behavior (1-3)

Seminar—1-3 hours. Prerequisite: consent of instructor. Selected topics in animal behavior. (S/U grading only.) —F, W, S. (F, W, S.)

#### 294. Seminar in Behavioral Ecology of Predators and Prey (3)

Seminar—2 hours. Prerequisite: graduate standing. Presentation and analysis of research papers on social and foraging behavior of predatory animals, antipredator strategies of prey species, co-evolution of predators and prey, and ecology of predator-prey interactions. May be repeated two times for credit. (Same course as Wildlife, Fish, and Conservation Biology 294.) Offered in alternate years. —W. Caro

#### 298. Group Study in Animal Biology (1-5)

Prerequisite: graduate standing; consent of instructor. May be repeated two times for credit. —F, W, S, Su. (F, W, S, Su.)

#### 299. Research (1-12)

Prerequisite: and consent of instructor. (S/U grading only.)

### Professional

#### 396. Teaching Assistant Training Practicum (1-4)

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## Animal Biology

(College of Agricultural and Environmental Sciences)

Department of Entomology and Nematology.

### Faculty

Edward P. Caswell-Chen, Ph.D., Professor  
Joanna Chiu, Ph.D., Assistant Professor  
Brian R. Johnson, Ph.D., Assistant Professor  
Neal M. Williams, Ph.D., Associate Professor  
Robert Kimsey, Ph.D., Lecturer

### The Major Program

The Animal Biology major offers students training in the biological and natural sciences as they apply to animals. The major covers the basic biological sciences that explain animal evolution, systematics, ecology, physiology and molecular biology. Students in the Animal Biology major are encouraged to think beyond particular groups of animals in which they are interested and to consider science as a process and a way of advancing society. Emphasis is on biological principles that can be used in research or in solving societal problems associated with animals in agriculture, urban areas, or natural environments.

**The Program.** The Animal Biology major consists of core courses in the biological sciences that build

an understanding of animal biology from the molecular to the ecological and evolutionary levels of organization. After completing these core courses, students have the option of specializing in various interdisciplinary aspects of animal biology, and plan their chosen emphasis of study as part of a required discussion course and in consultation with their adviser. The Animal Biology major emphasizes courses on biological principles as opposed to courses on animal care and husbandry. This program includes a senior thesis, which each student designs to bridge the disciplines of the major.

**Internships and Career Alternatives.** The program and interests of each student in solving societal problems guides him or her to logical internship and career choices. On- and off-campus internship opportunities are available in research laboratories, in field situations, with governmental agencies, with private industry, and in international programs. A degree in Animal Biology prepares students for careers in research, teaching, governmental regulation, health or agriculture as each relates to the integrative biology or ecology of animals. Careers in veterinary medicine, animal husbandry and animal management are open to Animal Biology majors, however, other preparation may be required. Students in the major gain research experience and may choose to continue their training at the graduate or professional level in a variety of biological disciplines.

### B.S. Major Requirements:

	UNITS
<b>Preparatory Subject Matter .....</b>	<b>68-74</b>
Biological Sciences 2A, 2B, and 2C .....	14
Chemistry 2A-2B-2C, and 8A-8B or 118A-118B.....	21-23
Mathematics 16A-16B-16C or 17A-17B-17C or 21A-21B-21C.....	9-12
Physics 7A-7B-7C.....	12
One course from: Statistics 13 or 100 or 102 or Agricultural Management and Rangeland Resources 120.....	4
Animal Biology 50A, 50B, 50C.....	8
<b>Depth Subject Matter .....</b>	<b>29-38</b>
Biological Sciences 101 .....	4
Animal Biology 102 and 103 or Biological Sciences 102 and 103 .....	6-10
One course from: Neurobiology, Physiology, and Behavior 101, 117; Entomology 102; Wildlife, Fish, and Conservation Biology 121 .....	3-5
One course from: Anatomy, Physiology and Cell Biology 100; Entomology 101; Neurobiology, Physiology, and Behavior 123 .....	3-4
Evolution and Ecology 100 .....	4
One course from: Environmental Science and Policy 100, 121; Evolution and Ecology 101, 102 .....	4
Animal Biology 187 .....	2
Animal Biology 189 and 189D .....	3-5
<b>Restricted Electives .....</b>	<b>25</b>
Focused specialty upper division courses as outlined in the student's major proposal (from course 187) with approval of an adviser.	
<b>Total Units for the Degree .....</b>	<b>122-137</b>

**Master Adviser.** R. Kimsey

**Major Adviser.** E. Galvan Hack

**Advising Center** for the major, including peer advising, is located in 150 and 152 Hutchison Hall 530-754-7277; [abi-advising@ucdavis.edu](mailto:abi-advising@ucdavis.edu).

### Courses in Animal Biology (ABI)

#### Lower Division

##### 50A. Animal Biology Laboratory (2)

Lecture/laboratory—4 hours. Scientific methods for answering questions in animal biology by doing exercises to demonstrate hypothesis testing and reporting, short laboratory, population and field experiments. Maintain notebooks, analyze data, interpret results and write reports. —F. (F.) Kimsey

**50B. Animal Biology (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 1A, Biological Sciences 1B (may be taken concurrently). Basic biological disciplines important to an understanding of practical animal biology issues including the evolution of animal groups, genetic mechanisms, animal physiology as it relates to maintenance and production, and aspects of comparative anatomy, behavior and ecology.—W. (W.) Caswell-Chen, Johnson, Williams

**50C. Animal Biology (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 1B, 1C, courses 50A, 50B. Animal management and conservation. Societal concerns arising from management and conservation issues, including economics, aesthetics, regulations, safety, public perspectives and advocacy.—S. (S.) Chui, Lanzaro

**92. Internship in Animal Biology (1-12)**

Internship—3-36 hours. Prerequisite: consent of instructor. Office, laboratory or fieldwork off or on campus in research, governmental regulation, policy making, and private enterprise dealing with animal related issues of production, welfare, pest management, biodiversity and the environment. All requirements of Internship Approval Request form must be met. (P/NP grading only.)

**98. Directed Group Study (1-5)**

(P/NP grading only.)

**99. Special Study for Undergraduates (1-5)**  
(P/NP grading only.)**Upper Division****102. Animal Biochemistry and Metabolism (5)**

Lecture—4 hours; discussion—1 hour. Prerequisite: Chemistry 2A, 2B, 8A and 8B or 118A and 118B. Water and biological buffers; thermodynamics of metabolism; structure and function of biomolecules; enzyme kinetics and function; membrane biology; digestion and absorption; carbohydrate metabolism. Not open for credit to students who have completed Biological Sciences 102.—F. (F.) Calvert

**103. Animal Biochemistry and Metabolism (5)**

Lecture—4 hours; discussion—1 hour. Prerequisite: course 102 or Biological Sciences 102. Physiological function and metabolism of lipids and amino acids; integrative metabolism; biochemical basis for nutrient requirements; structure and function of vitamins; mineral metabolism and requirements. Not open for credit to students who have completed Biological Sciences 103.—W. (W.) Calvert, Rucker

**187. Animal Biology Seminar (2)**

Seminar—1 hour; discussion—1 hour. Prerequisite: junior standing, courses 50A, 50B, 50C. Seminar leading to development of the Major Proposal for the Animal Biology major.—F. (F.) R. Kimsey

**189. Senior Practicum (2)**

Independent study—6 hours. Prerequisite: junior standing, courses 50A, 50B, 50C, and 187; course 189D concurrently the first time course 189 is taken. The practicum may be an experimental research project, a library research project or some other creative activity that will serve as a capstone experience for the Animal Biology major. May be repeated one time for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

**189D. Senior Practicum Discussion (1)**

Discussion—1 hour. Prerequisite: junior standing, courses 50A, 50B, 50C, and 187; course 189 required concurrently. Course helps prevent or solve problems during the students' senior practicum activity. (P/NP grading only.)—F, W, S. (F, W, S.)

**192. Internship in Animal Biology (1-12)**

Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Office, laboratory or fieldwork off or on campus in research, governmental regulation, policy making, and private enterprise dealing with animal related issues of production, welfare, pest management, biodiversity

and the environment. All requirements of Internship Approval Request form must be met. (P/NP grading only.)

**198. Directed Group Study (1-5)**

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.)

## Animal Biology (A Graduate Group)

Trish Berger, Ph.D., Interim Chairperson of the Group

**Group Office.** 1249 Meyer Hall

530-752-2382; Fax 530-752-0175

<http://animalbiology.ucdavis.edu>

**Faculty**

Danika L. Bannasch, Ph.D., Associate Professor (*Population Health and Reproduction; School of Veterinary Medicine*)

Rebecca Bellone, Ph.D., Associate Adjunct Professor (*Population Health and Reproduction; School of Veterinary Medicine*)

Trish Berger, Ph.D., Professor (*Animal Science*)

Chris C. Calvert, Ph.D., Professor, Emeriti Faculty (*Animal Science*)

Bruce W. Christensen, D.V.M., Assistant Professor (*Population Health & Reproduction; School of Veterinary Medicine*)

Alan J. Conley, Ph.D., Professor (*Population Health and Reproduction; School of Veterinary Medicine*)

Richard E. Connor, Ph.D., Assistant Adjunct Professor (*Anatomy, Physiology & Cell Biology; School of Veterinary Medicine*)

Mary E. Delany, Ph.D., Professor (*Animal Science*)

Edward J. DePeters, Ph.D., Professor (*Animal Science*)

James G. Fadel, Ph.D., Professor (*Animal Science*)

Nann A. Fangue, Ph.D., Assistant Professor (*Wildlife, Fish, and Conservation Biology*)

Andrea J. Fascati, V.M.D., Ph.D., Professor (*Molecular Biosciences; School of Veterinary Medicine*)

Carrie Finno, Ph.D., Assistant Professor (*Population Health and Reproduction; School of Veterinary Medicine*)

Janet Foley, Ph.D., Professor (*Medicine & Epidemiology; School of Veterinary Medicine*)

Rodrigo Gallardo, Ph.D., Assistant Professor (*Poultry Medicine; School of Veterinary Medicine*)

Matthias Hess, Ph.D., Assistant Professor (*Animal Science*)

Russell C. Hovey, Ph.D., Professor (*Animal Science*)

Amy S. Kapatkin, D.V.M., Professor (*Surgical & Radiological Sciences; School of Veterinary Medicine*)

Ermias Kebede, Ph.D., Professor (*Animal Science*)

Kirk C. Klasen, Ph.D., Professor (*Animal Science*)

Dietmar Kuelz, Ph.D., Professor (*Animal Science*)

Yanhong Liu, Ph.D., Assistant Professor (*Animal Science*)

Elizabeth Maga, Ph.D., Associate Researcher and Lecturer (*Animal Science*)

Brenda J. McCowan, Ph.D., Professor (*Veterinary Medicine Teaching and Research Center and California National Primate Research Center*)

Juan F. Medrano, Ph.D., Professor (*Animal Science*)

Joy A. Mench, Ph.D., Professor (*Animal Science*)

Deanne Meyer, Ph.D., Specialist in Cooperative Extension and Lecturer (*Animal Science*)

Stuart Meyers, Ph.D., Professor (*Anatomy, Physiology and Cell Biology; School of Veterinary Medicine*)

Mike Mienaltowski, Ph.D., Assistant Professor (*Animal Science*)

Michael R. Miller, Ph.D., Assistant Professor (*Animal Science*)

Frank M. Mitloehner, Ph.D., Associate Professor (*Animal Science*)

James D. Murray, Ph.D., Professor (*Animal Science*)

Anita M. Oberbauer, Ph.D., Professor (*Animal Science*)

James W. Olijen, Ph.D., Specialist in Cooperative Extension and Lecturer (*Animal Science*)

Peter H. Robinson, Ph.D., Specialist in Cooperative Extension and Lecturer (*Animal Science*)

Jan F. Roser, Ph.D., Professor, Emeriti Faculty (*Animal Science*)

Pablo J. Ross, Ph.D., Associate Professor (*Animal Science*)

Heidi A. Rossow, Ph.D., Assistant Professor (*Population, Health, and Reproduction; School of Veterinary Medicine*)

Benjamin N. Sacks, Ph.D., Associate Adjunct Professor (*Population, Health, and Reproduction; School of Veterinary Medicine*)

Roberto D. Sainz, Ph.D., Professor (*Animal Science*)

Susan A. Stover, D.V.M., Ph.D., Professor (*Anatomy, Physiology, and Cell Biology; School of Veterinary Medicine*)

Brian D. Todd, Ph.D., Associate Professor (*Wildlife, Fish, and Conservation Biology*)

Anne Todgham, Ph.D., Assistant Professor (*Animal Science*)

M. Cecilia Torres-Penedo, Ph.D., Associate Research Geneticist (*Veterinary Genetics Laboratory; School of Veterinary Medicine*)

Cassandra B. Tucker, Ph.D., Associate Professor (*Animal Science*)

Alison L. Van Eenennaam, Ph.D., Specialist in Cooperative Extension and Lecturer (*Animal Science*)

Jason Watters, Ph.D., Associate Adjunct Professor (*Animal Science*)

Huaijun Zhou, Ph.D., Associate Professor (*Animal Science*)

Richard A. Zinn, Ph.D., Professor (*Animal Science; located at Desert Research and Extension Center*)

**Graduate Study.** The Graduate Group in Animal Biology offers programs of study and research leading to the M.S. and the Ph.D. degrees. The Animal Biology Graduate Group focuses on integrated animal biology. Each student individually tailors his/her program of study to meet individual needs. The Animal Biology Graduate Group is unique in encouraging a multidisciplinary or interdisciplinary approach involving physiology, nutrition, genetics, ecology and/or behavior within the context of organismal animal biology.

**Preparation.** Applicants should have undergraduate preparation in a field appropriate to the course of study selected, including upper division coursework in most of the following subjects: biochemistry, genetics, nutrition, physiology, and integrative animal biology such as animal management.

**Graduate Advisers.** R.C. Hovey, E.A. Maga, C.B. Tucker, J.D. Murray, E.Kebreab, P.J. Ross

## Courses in Animal Biology (ABG) Graduate

**200A. Integrated Animal Biology I (3)**

Lecture/discussion—3 hours. Prerequisite: graduate standing; Biological Sciences 101 or equivalent or consent of instructor. Class size limited to 20 students; Pass One restricted to Animal Biology Graduate Group students. Natural history, management, historical and current uses, and specialized disciplinary features of model and novel animal systems used in research. Development of conceptual approaches in organismal biology to improve experimental design and interpretation of interdisciplinary research studies.—F. (F.) Sainz

**200B. Integrated Animal Biology II (3)**

Lecture/discussion—3 hours. Prerequisite: course 200A. Limited enrollment; Pass One restricted to Animal Biology Graduate Group students. Natural history, management, historical and current uses, and specialized disciplinary features of model and novel animal systems used in research. Development of

conceptual approaches in organismal biology to improve experimental design and interpretation of interdisciplinary research studies.—S. (S.) Berger

### **202. Grant Procurement and Administration (2)**

Lecture—1 hour; discussion/laboratory—1 hour. Prerequisite: course 200B. Class size limited to 12 graduate students; Pass One restricted to Animal Biology Graduate Group students. Topics include: structure of grants, attention to specifications, concise persuasive writing, and grant budgeting. Identify grant opportunities, write a persuasive research grant proposal, and administer grants. Offered in alternate years.—F. (F.) Connon

### **250. Mathematical Modeling in Biological Systems (4)**

Lecture/discussion—4 hours. Prerequisite: graduate standing; Mathematics 16A, 16B, or equivalents required; Mathematics 16C or equivalent recommended; Statistics 100 or equivalent required; more than one course in statistics recommended; Animal Biology 102 or Biological Sciences 102 recommended or equivalent course in biochemistry. Limited enrollment. Model development and evaluation including sensitivity analyses using R. Four principle modeling methodologies included: algebraic functions of biological processes, physiological-based compartmental models, linear programming and meta-analysis. Fundamental background and understanding of mathematical modeling principles in biological systems.—W. (W.) Fadel, Kebreab

### **255. Physiology of the Stress Response (2)**

Lecture/discussion—2 hours. Prerequisite: graduate student. Definition of Stress; Physiological mechanisms of adaptation to stress; Hormonal control of the systemic stress response; Mechanisms of the cellular stress response; Discussion of current trends in stress physiology and current methods for studying the stress response. (Same course as Molecular, Cellular, and Integrative Physiology 255.)—S. (S.) Kueltz

### **290. Seminar in Animal Biology (1)**

Seminar—1 hour. Prerequisite: graduate standing. Seminar on advanced topics in animal biology. Presentations by members of the Animal Biology Graduate Group and guest speakers. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

### **290C. Research Conference (1)**

Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Student presentations of research in Animal Biology and discussions among participating students and Animal Biology faculty. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S, Su.)

### **298. Group Study in Animal Biology (1-5)**

Prerequisite: graduate standing; consent of instructor.

### **299. Research (1-11)**

Prerequisite: graduate standing and consent of instructor. Research with a faculty member in Animal Biology Graduate Group. May be repeated for credit. (S/U grading only.)—F, W, S, Su. (F, W, S, Su.)

## **Professional**

### **300. Methods in Teaching Animal Biology (2)**

Lecture/discussion—2 hours. Prerequisite: graduate standing and consent of instructor. Practical experience in the methods and problems of teaching animal biology. Includes analysis of laboratory exercises, discussion of teaching techniques, grading scientific essays, preparing for and conducting discussion or laboratory sections, formulating quiz and exam questions under instructor supervision. May be repeated up to three times for credit. (S/U grading only.)—F, W. (F, W.) Famula, Oberbauer

### **396. Teaching Assistant Training Practicum (1-4)**

Variable—3-12 hours. Prerequisite: graduate standing and consent of instructor. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## **Professional**

### **401. Ethics and Professionalism in Animal Biology (2)**

Discussion—2 hours. Restricted to graduate standing; Pass One restricted to Animal Biology graduate group students. Case studies and discussion of ethical and professional issues for animal biologists, including the use of animals in research and teaching, patenting and intellectual property, consulting and conflict of interest, scientific integrity, dealing with the media, and mentoring relationships. Offered in alternate years.—(F.) Mench

## **Animal Genetics**

(College of Agricultural and Environmental Sciences)

**Faculty.** See under Department of Animal Science, on page 162.

**Major Program.** See the major in Animal Science, on page 162.

**Related Courses.** See Biological Sciences 101, 101D; Evolution and Ecology 102, 175; Genetics Graduate Group courses; Microbiology 150, 170, 215, 260, 274, 292; Molecular and Cellular Biology 121, 141, 160L, 161, 162, 163, 164, 178, 182, 221C, 257, 262, 263; Neurobiology, Physiology, and Behavior 131; Plant Biology 151, 152, 154, 161A, 161B; Plant Pathology 215X, 217; Plant Sciences 220, 221.

## **Courses in Animal Genetics (ANG)**

Questions pertaining to the following courses should be directed to the instructor or to the Animal Science Advising Center in 1202 Meyer Hall 530-754-7915.

## **Upper Division**

### **101. Animal Cytogenetics (3)**

Laboratory/discussion—1 hour; laboratory—6 hours. Prerequisite: Biological Sciences 101, 102 or the equivalent. Principles and techniques of cytogenetics applied to animal systems; chromosome harvest techniques, analysis of mitosis and meiosis, karyotyping, chromosome banding, cytogenetic mapping, chromosome structure and function, comparative cytogenetics. GE credit: SciEng | SE.

### **105. Horse Genetics (2)**

Lecture—2 hours. Prerequisite: Animal Science 15; Biological Sciences 101. Coat color, parentage testing, medical genetics, pedigrees, breeds, the gene map and genus Equus. Emphasis on understanding horse genetics based on the unity of mammalian genetics and making breeding decisions based on fundamental genetic concepts. GE credit: SciEng | SE, SL.—S. (S.) Famula

### **107. Genetics and Animal Breeding (5)**

Lecture—4 hours; laboratory—3 hours. Prerequisite: Biological Sciences 101. Principles of quantitative genetics applied to improvement of livestock and poultry. Effects of mating systems and selection methods are emphasized with illustration from current breeding practices. GE credit: SciEng | SE.—F, W, (F, W.) Medrano, Miller

### **111. Molecular Biology Laboratory Techniques (4)**

Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1C, 101, 102, 103. Introduction to the concepts and techniques used in molecular biology; the role of this technology in both basic and applied animal research, and participation in laboratories using some of the most common techniques in molecular biology. GE credit: SciEng | SE, SL, VL, WE.—F. (F.) Kueltz, Murray

### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. Selected topics relating to animal genetics. (P/NP grading only.)

### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

## **Graduate**

### **204. Theory of Quantitative Genetics (3)**

Lecture—3 hours. Prerequisite: course 107 or the equivalent. Theoretical basis of quantitative genetics and the consequences of Mendelian inheritance. Concepts used to estimate quantitative genetic differences and basis for partitioning the phenotypic variance.

### **206. Advanced Domestic Animal Breeding (3)**

Lecture—3 hours. Prerequisite: course 107 and Animal Science 205; course 204 recommended. Procedures for the genetic evaluation of individuals to include selection indices and mixed model evaluation for single and multiple traits. Methods of estimating genetic trends. Offered in alternate years.

### **208. Estimation of Genetic Parameters (3)**

Lecture—3 hours. Prerequisite: course 107 and Animal Science 205; courses 204 and 108 recommended. General methods for the estimation of components of variance and covariance and their application to the estimation of heritability, repeatability and genetic correlations are considered. Specific emphasis is given to procedures applicable to livestock populations under selection.

### **211. Genetic Engineering of Animals (2)**

Lecture—1 hour; lecture/discussion—1 hour. Review of techniques for the genetic engineering of animals and their limitations and applications. Student-led discussions of recent papers in the field and possible future applications of genetically engineered animals in basic research and applied agricultural and medical research. (S/U grading only.)—Murray

### **212. Sequence Analysis in Molecular Genetics (2)**

Lecture/laboratory—2 hours. Prerequisite: Biological Sciences 101 or the equivalent; graduate standing or consent of instructor. Use of computer algorithms and online databases to analyze nucleic acid and protein sequences in molecular genetics research.—Medrano

### **298. Group Study (1-5)**

Prerequisite: consent of instructor. Lectures and discussions of advanced topics in animal genetics. (S/U grading only.)

### **299. Research in Animal Genetics (1-12)**

Prerequisite: consent of instructor. (S/U grading only.)

## **Animal Physiology**

See Animal Biology, on page 160;

Animal Science, on page 162;

Neurobiology, Physiology, and

Behavior, on page 478; and

Molecular, Cellular, and Integrative

Physiology (A Graduate Group), on

page 466.

## **Animal Science**

(College of Agricultural and Environmental Sciences)

Anita M. Oberbauer Ph.D., Chairperson of the Department

**Department Office.** 2223 Meyer Hall  
530-752-1250;  
<http://animalscience.ucdavis.edu/>

**Master Adviser.** E.J. DePeters

**Undergraduate Advising.** 1202 Meyer Hall  
530-754-7915; <http://asac.ucdavis.edu>

**Advising Center** for the major, minors and course offerings (including peer advising) is located in the Animal Science Advising Center in 1202 Meyer Hall 530-754-7915. Each student will be assigned a faculty adviser through this office upon entering the major.

**Graduate Advising.** 1249 Meyer Hall  
530-752-2382

## Faculty

- Trish J. Berger, Ph.D., Professor  
 Mary E. Delany, Ph.D., Professor and Executive Associate Dean in CA&ES  
 Edward J. DePeters, Ph.D., Professor, *Academic Senate Distinguished Teaching Award, UC Davis Prize for Undergraduate Teaching and Scholarly Achievement*  
 John M. Eadie, Ph.D., Professor (*Wildlife, Fish & Conservation Biology; Animal Science*)  
 James G. Fadel, Ph.D., Professor  
 Matthias Hess, Ph.D., Assistant Professor  
 Russell C. Hovey, Ph.D., Professor  
 Silas S. O. Hung, Ph.D., Professor  
 Ermias Kebreab, Ph.D., Professor  
 Annie J. King, Ph.D., Professor  
 Kirk C. Klasing, Ph.D., Professor  
 Dietmar Kueltz, Ph.D., Professor  
 Yanhong Liu, Ph.D., Assistant Professor  
 Maja M. Makagon, Ph.D., Assistant Professor  
 Juan F. Medrano, Ph.D., Professor  
 Michael J. Mienaltowski, Ph.D., Assistant Professor  
 Michael R. Miller, Ph.D., Assistant Professor  
 Frank M. Mitloehner, Ph.D., Professor and Specialist in Cooperative Extension  
 James D. Murray, Ph.D., Professor  
 Anita M. Oberbauer, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*  
 L. Allen Pettry, Lecturer (*PSOE*)  
 Pablo J. Ross, Ph.D., Associate Professor  
 Roberto D. Sainz, Ph.D., Professor  
 Anne Todgham, Ph.D., Assistant Professor  
 Cassandra B. Tucker, Ph.D., Associate Professor  
 Huaijun Zhou, Ph.D., Associate Professor  
 Richard A. Zinn, Ph.D., Professor

## Emeriti Faculty

- Hans Abplanalp, Ph.D., Professor Emeritus  
 Thomas E. Adams, Ph.D., Professor Emeritus  
 Academic Senate Distinguished Teaching Award  
 Gary B. Anderson, Ph.D., Distinguished Professor Emeritus, *Distinguished Teaching Award- Graduate/Professional, UC Davis Prize for Undergraduate Teaching and Scholarly Achievement, Academic Senate Distinguished Teaching Award*  
 C. Robert Ashmore, Ph.D., Professor Emeritus  
 C. Christopher Calvert, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*  
 Ernest S. Chang, Ph.D., Professor Emeritus  
*(Biological Sciences, Bodega marine Laboratory)*  
 Wallis H. Clark, Jr., Ph.D., Professor Emeritus  
 Douglas E. Conklin, Ph.D., Professor Emeritus  
 Serge I. Doroshov, Ph.D., Professor Emeritus  
 Thomas R. Famula, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*  
 Graham A. E. Gall, Ph.D., Professor Emeritus  
 William N. Garrett, Ph.D., Professor Emeritus  
 Yu-Bang Lee, Ph.D., Professor Emeritus  
 Bernard P. May, Ph.D., Adjunct Professor Emeritus  
 Joy A. Mench, Ph.D., Professor Emerita  
 James R. Millam, Ph.D., Professor Emeritus  
 Edward O. Price, Ph.D., Professor Emeritus  
 Kathryn Radke, Ph.D., Professor Emerita  
 Janet F. Roser, Ph.D., Professor Emerita  
 Wesley W. Weathers, Ph.D., Professor Emeritus

## Affiliated Faculty

- Richard A. Blatchford, Ph.D., Assistant Poultry Extension Specialist  
 David A. Bunn, Ph.D., Assistant Adjunct Professor  
 Fred S. Conte, Ph.D., Specialist in Cooperative Extension and Lecturer  
 Joshua Hull, Ph.D., Assistant Adjunct Professor  
 Peng Ji, Ph.D., Assistant Adjunct Professor  
 Elizabeth A. Maga, Ph.D., Adjunct Professor  
 Deanne Meyer, Ph.D., Specialist in Cooperative Extension and Lecturer  
 James W. Oltjen, Ph.D., Specialist in Cooperative Extension and Lecturer

- Peter H. Robinson, Ph.D., Specialist in Cooperative Extension and Lecturer  
 Andrea Schreier, Ph.D., Assistant Adjunct Professor  
 Alison L. Van Eenennaam, Ph.D., Specialist in Cooperative Extension and Lecturer  
 Dana B. Van Liew, M.Ed., Continuing Lecturer *Academic Federation Excellence in Teaching Award*  
 Jason V. Watters, Ph.D., Associate Adjunct Professor

## The Major Program

The Animal Science major is devoted to the sciences central to understanding biological function of domestic and captive animals, their care, management, and utilization by people for food, fiber, companionship and recreation. Advances in science and technology, and an ever-growing human population, have increased the complexity of issues surrounding the care and management of animals. Specializations within the major allow students to develop a scientific appreciation of animals and their relationship to their environment. Graduates in Animal Science are able to advance the science and technology of animal care and management in an objective and effective manner for the betterment of animals and society.

**The Program.** The curriculum provides depth in the biological and physiological sciences and allows students to specialize within the broad field of applied animal science. Study begins with introductory courses in animal science, biology, chemistry, mathematics, and statistics. Students undertake advanced courses in animal behavior, biochemistry, genetics, nutrition, and physiology and the integration of these sciences to animal function, growth, reproduction, and lactation. Students complete the curriculum by choosing a specialization in either an animal science discipline (behavior, biochemistry, genetics, nutrition, or physiology) or in the sciences particular to a class of animals (aquatic, avian, companion and captive, equine, laboratory, livestock and dairy, or poultry).

**Career Alternatives.** A wide range of career opportunities are available to graduates. The primary goal of the major is to prepare students for graduate study leading to the M.S. and Ph.D. degrees; for continued study in a professional school such as veterinary medicine, human medicine or dentistry; for careers in research, agricultural production, farm and ranch management, or positions in business, sales, financial services, health care, agricultural extension, consulting services, teaching, journalism, or laboratory technology.

## B.S. Major Requirements:

### UNITS Preparatory Subject Matter.....53-57

- |  |       |
|--|-------|
| Animal Science 1, 2, 41, 41L.....                    | 12    |
| Biological Sciences 2A, 2B, 2C .....                 | 15    |
| Chemistry 2A, 2B and 8A, 8B or<br>118A, 118B.....    | 16-18 |
| Mathematics 16A, 16B or 17A, 17B or 21A,<br>21B..... | 6-8   |
| Plant Sciences 120 or Statistics 100.....            | 4     |
- Note: Some professional and graduate schools may require additional preparatory subject matter. Please consult the advising center.

### Depth Subject Matter .....39-43

- Biology:** Biological Sciences 101; Animal Genetics 107; Animal Biology 102, 103; Neurobiology, Physiology, and Behavior 101 or Animal Science 100 .....24  
**Integrative Animal Biology:** Animal Science 123, 124, and Neurobiology, Physiology, and Behavior 121 and 121L .....13  
**Laboratory:** Select one from the following:  
 Animal Genetics 111; Animal Science 106, 136, 137, or 139; Microbiology 102L; Molecular and Cellular Biology 120L or 160L; Neurobiology, Physiology, and Behavior 101L or 104L; Pathology, Microbiology, and Immunology 126L .... 2-6

## Area of Specialization .....20-23

Choose one area of specialization below; the program of study must be approved in advance by your faculty adviser. Courses must be taken for a letter grade.

### Animal Science with a Disciplinary Focus.....20

Select 20 upper division units, with approval from your faculty adviser, to form a coherent series of courses in one of the following disciplines: animal behavior, biochemistry, genetics, nutrition, or physiology.

### Aquatic Animals.....20

Animal Science 18 and 131; Nutrition 124; and Animal Science 118 or 119. Select additional upper division units from any Animal Genetics or Animal Science course, or other courses approved by your faculty adviser. Students in this specialization must take Animal Science 136 to meet their Laboratory Depth Subject Matter requirement.

Students in this specialization may elect to substitute any of Biological Sciences 104, Evolution and Ecology 112, or Wildlife, Fish, and Conservation Biology 120 and 121 for the 12-unit requirement under Integrative Animal Biology, with approval of your faculty adviser.

### Avian Sciences.....20

Avian Sciences 13, 100, 150; Nutrition 123, 123L.

Select additional upper division units from any Animal Genetics, Animal Science, or Avian Sciences courses or other courses approved by your adviser. Students in this specialization must substitute Avian Sciences 103, 121, and Neurobiology, Physiology, and Behavior 117 for the Animal Science 124 and Neurobiology, Physiology, and Behavior 121 and 121L requirement under Integrative Animal Biology.

### Companion and Captive Animals.....20

Animal Science 42, 142; Nutrition 115 or 122 or 123 and 123L; Animal Science 170. Select additional upper division units from any Animal Genetics, Animal Science or Avian Sciences course, or from Nutrition 115, 122, 123, 123L or other courses.

### Equine Science .....20

Animal Science 15, 115, 141 and one of Animal Science 125, 126 or 127. Select additional upper division units from any Animal Genetics or Animal Science course, or from Nutrition 115, 122, 123, 123L or other courses approved by your faculty adviser.

### Laboratory Animals .....23

Animal Science 42, 103, 140, Nutrition 123, 123L, Animal Science 104 or Neurobiology, Physiology, and Behavior 102, and Anatomy, Physiology and Cell Biology 100 or Neurobiology, Physiology, and Behavior 123.

### Livestock and Dairy .....20

Select two of Animal Science 143, 144, 146; Animal Science 145 or 147; Nutrition 115.

Select additional upper division units from any Animal Genetics, Animal Science or Avian Sciences course, or from Nutrition 122, 123, 123L or other courses approved by your faculty adviser.

### Poultry .....20

Avian Sciences 11, 100, 150; Animal Science 143; Avian Sciences 149 or Food Science and Technology 121; Nutrition 123, 123L.

Select additional upper division units from any Animal Genetics, Animal Science, Avian Sciences, or other courses approved by your faculty adviser.

Students in this specialization must substitute Avian Sciences 103, 121, and Neurobiology, Physiology, and Behavior 117 for the Animal Science 124 and Neurobiology, Physiology, and Behavior 121 and 121L requirement under Integrative Animal Biology.

### Total Units for the Major ..... 112-125

### Minor Program Requirements:

The Department of Animal Science offers five minor programs open to students majoring in other disciplines who wish to complement their study programs with a minor in Animal Science. Some courses have required prerequisites not included as part of the minor, and students should plan accordingly.

UNITS

### Animal Science—Animal Biology ..... 20

Animal Science 15, 42, 41 and 41L, or 41 and 21 .....	3-4
Animal Science 103 or 104 .....	3-4
Animal Science 123, 124, or Neurobiology, Physiology, and Behavior 121 and 121L .....	4
Additional upper division courses .....	8-10
Select additional units to complete the 20-unit total from: upper division Animal Science courses, Animal Genetics courses, Neurobiology, Physiology, and Behavior 121, 121L, Nutrition 115, 122, 123, 123L. Variable unit courses (92, 99, 192, 197T, 198, 199) are not allowed for the completion of this requirement.	

### Animal Science—Animal Genetics ..... 20

Animal Science 15, 42, 41 and 41L, or 41 and 21 .....	3-4
Animal Genetics 107, 111 .....	9
Additional upper division courses .....	7-8
Select additional units to complete the 20-unit total from: upper division Animal Science courses, Animal Genetics courses, Avian Science 103, Neurobiology, Physiology, and Behavior 121, 121L, Nutrition 115, 122, 123, 123L. Variable unit courses (92, 99, 192, 197T, 198, 199) are not allowed for the completion of this requirement.	

### Animal Science—Aquaculture ..... 20

Animal Science 18 .....	4
Animal Science 118, 119 .....	8
Additional upper division courses .....	8
Select additional units to complete the 20-unit total from upper division Animal Science courses, Animal Genetics courses, Applied Biological Systems Technology 161, Nutrition 124, Wildlife, Fish, and Conservation Biology 121. Variable unit courses (92, 99, 192, 197T, 198, 199) are not allowed for the completion of this requirement.	

### Animal Science—Dairy/Livestock ..... 20

Animal Science 41 and 41L or 21 .....	4
Animal Science 104 .....	4
Additional upper division courses .....	12
Select four or eight units from Animal Science 143, 144, 146.	
Select additional units to complete the 20-unit total from: upper division Animal Science courses, Animal Genetics courses, Neurobiology, Physiology, and Behavior 121, 121L, Nutrition 115, 122, 123, 123L. Variable unit courses (92, 99, 192, 197T, 198, 199) are not allowed for the completion of this requirement.	

### Animal Science—Equine ..... 21

Animal Science 15 .....	3
Animal Science 103 or 104 .....	3-4
Animal Science 115, 141 .....	8
Animal Science 125 or 126 .....	3
One additional upper division course ....	2-3
Select from: upper division Animal Science courses, Animal Genetics courses, Neurobiology, Physiology, and Behavior 121, 121L, Nutrition 115, 122, 123, 123L.	

Variable unit courses (92, 99, 192, 197T, 198, 199) are not allowed for the completion of this requirement.

### Minor Adviser. E.J. DePetres

**Graduate Study.** The Animal Biology Graduate Group offers a program of study and research leading to the M.S. or Ph.D. degree in Animal Biology. See [Animal Biology \(A Graduate Group\)](#), on page 161; see also [Graduate Studies](#), on page 120.

### Courses in Animal Science (ANS)

#### Lower Division

##### 1. Domestic Animals and People (4)

Lecture—3 hours; laboratory—3 hours. Animal domestication and factors affecting their characteristics and distribution. Animal use for food, fiber, work, drugs, research and recreation; present and future roles in society. Laboratory exercises with beef and dairy cattle, poultry, sheep, swine, laboratory animals, fish, horses, meat and dairy products. GE credit: SciEng, Wrt | SE, WE. —F. (F.) Hovey

##### 2. Introductory Animal Science (4)

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 1 recommended, Biological Sciences 2A recommended. Open to students in Animal Science, Animal Science and Management, Agricultural and Environmental Education, and Sustainable Agriculture and Food Systems majors. Growth, reproduction, lactation, inheritance, nutrition, and disease control in domesticated animals and species used in aquaculture; the application of sciences to animal production. GE credit: SciEng, Wrt | SE, SL, VL, WE. —S. (S.) Murray

##### 12. Animal Science: Basic Principles and Application (3)

Lecture—3 hours. Overview of domestic and global animal industries. Exploration of production systems, animal biology, genetics, anatomy, physiology, reproduction, health, behavior, research, biotechnology and welfare. GE credit: SciEng | SE, SL, VL, WE. —W. (W.) Mienaltowski

##### 15. Introductory Horse Husbandry (3)

Lecture—3 hours. Introduction to care and use of light horses emphasizing the basic principles for selection of horses, responsibilities of ownership, recreational use and raising of foals. GE credit: SciEng | QL, SE, VL, WE. —W. (W.) Mienaltowski

##### 17. Canine Behavior: Learning and Cognition (3)

Lecture—3 hours. Domestic dog behavior from basic principles of learning to complex cognitive behaviors; interaction between learning and cognition including how these processes contribute to interactions with humans; basic genetic correlates of learning and cognition.

##### 18. Introductory Aquaculture (4)

Lecture—3 hours; discussion—1 hour. Historical and contemporary aquacultural practices. Interaction between the aqueous culture environment and the biology of aquatic animals. Impact of economics and governmental policies on the development of aquaculture. Interaction of aquacultural practices with larger societal goals. GE credit: SciEng | SE, OL, QL, VL, WE. —F. (F.) Kuetz

##### 21. Livestock and Dairy Cattle Judging (2)

Laboratory—6 hours. Prerequisite: course 1 or 2 recommended. Evaluation of type as presently applied to light horses, meat animals and dairy cattle. Relationship between form and function, form and carcass quality, and form and milk production. GE credit: SciEng | OL, SE. —S. (S.) Van Liew

##### 22A. Animal Evaluation (2)

Laboratory—3 hours; fieldwork—30 hours (total). Prerequisite: course 21 or the equivalent. Attendance at 3 one-day weekend field trips required. Domestic livestock species with emphasis on visual appraisal, carcass evaluation, and application of performance information. Emphasis on accurate written and oral descriptions of evaluations. Prerequisite

to intercollegiate judging competition. Offered in alternate years. (P/NP grading only.) GE credit: OL, SE. —(F.) Van Liew

### 22B. Animal Evaluation (2)

Laboratory—3 hours; fieldwork—30 hours (total). Prerequisite: course 22A or the equivalent. Attendance at 3 one-day weekend field trips required. Continuation of course 22A with emphasis on specific species: swine, beef cattle and sheep. Application of animal science principles to selection and management problem-solving scenarios. Prerequisite to intercollegiate judging competition. Offered in alternate years. (P/NP grading only.) GE credit: OL, SE. —(W.) Van Liew

### 41. Domestic Animal Production (2)

Lecture—2 hours. Principles of farm animal management, including dairy and beef cattle, sheep, and swine. Industry trends, care and management, nutrition, and reproduction. GE credit: SciEng | SE. —F. (F.) Mitloehner

### 41L. Domestic Animal Production Laboratory (2)

Discussion—1 hour; laboratory—3 hours. Prerequisite: course 41 can be concurrent. Animal production principles and practices, including five field trips to dairy cattle, beef cattle, sheep, and swine operations and campus labs. (P/NP grading only.) GE credit: QL, SE, SL, VL, WE. —F. (W. W.) Mitloehner, Pettery

### 42. Introductory Companion Animal Biology (4)

Lecture—3 hours; discussion—1 hour. Companion animal domestication. Historical, contemporary perspectives. Legislation concerning companion animals. Selected topics in anatomy, physiology, genetics, nutrition, behavior and management. Scientific methods in studying the human-animal bond. Discussions: application of biological concepts to problems related to companion animals. GE credit: SciEng, Wrt | QL, SE, SL, WE. —W. (W.) Oberbauer

### 49A. Animal Management Practices: Aquaculture (2)

Discussion—1 hour; laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.)

### 49B. Animal Management Practices: Beef (2)

Discussion—1 hour; laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) —F. S. (F. S.)

### 49C. Animal Management Practices: Dairy (2)

Discussion—1 hour; laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) —F. W. S. (F. W. S.)

### 49D. Animal Management Practices: Goats (2)

Discussion—1 hour; laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) —F. S. (F. S.)

### 49E. Animal Management Practices: Horses (2)

Discussion—1 hour; laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) —F. W. (F. W.)

### 49F. Animal Management Practices: Laboratory Animals (2)

Discussion—1 hour; laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.) —F. S. (F. S.)

**49G. Animal Management Practices: Meats (2)**

Discussion—1 hour; laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.)—F, W, S. (F, W, S.)

**49H. Animal Management Practices: Poultry (2)**

Discussion—1 hour; laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.)—F, W, S. (F, W, S.)

**49I. Animal Management Practices: Sheep (2)**

Discussion—1 hour; laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.)—F, W, S. (F, W.)

**49J. Animal Management Practices: Swine (2)**

Discussion—1 hour; laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.)—F, W, S. (F, W.)

**49K. Animal Management Practices: Captive and Companion Avian (2)**

Discussion—1 hour; laboratory—3 hours. Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken. (P/NP grading only.)—F, W, S. (F, W.)

**90C. Research Group Conference (1)**

Discussion—1 hour. Prerequisite: lower division standing, consent of instructor. Restricted to lower division standing. Weekly conference on research problems, progress and techniques in the animal sciences. May be repeated for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

**92. Internship in Animal Science (1-12)**

Internship—3-18 hours. Prerequisite: consent of instructor. Restricted to lower division standing. Internship off and on campus in dairy, livestock, and aquaculture production, research and management; or in a business, industry, or agency associated with these or other animal enterprises. All requirements of Internship Approval form must be met. (P/NP grading only.)—F, W, S. (F, W, S.)

**98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. Restricted to lower division standing. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor. Restricted to lower division standing. (P/NP grading only.)

**Upper Division****100. Animal Physiology (5)**

Lecture—4 hours; discussion—1 hour. Prerequisite: Biological Sciences 2A, Chemistry 2B. Pass One restricted to students in the Animal Science and Animal Science and Management majors. Basic principles of animal physiology in domesticated and captive animals with a comparative approach. Molecular, biochemical, chemical and physical aspects and their influences on function of physiological systems in animals. Not open for credit to students who have taken Neurobiology, Physiology, and Behavior 101. GE credit: SciEng | SE. —S. (S.) Todgham

**103. Animal Welfare (4)**

Lecture—2 hours; discussion—2 hours. Prerequisite: course 104 or Neurobiology, Physiology, and Behavior 102 or Wildlife, Fish, and Conservation Biology 141 or consent of instructor. Restricted to upper division standing. Application of principles of animal behavior and physiology to assessment and improvement of the welfare of wild, captive, and domestic animals. Topics include animal pain, stress,

cognition, motivation, emotions, and preferences, as well as environmental enrichment methods. GE credit: SciEng | SE, SL. —F. (F.) Makagon

**104. Principles and Applications of Domestic Animal Behavior (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or Biological Sciences 2B. Basic principles of animal behavior as applied to domesticated species. Emphasis placed on application of the principles of animal behavior. GE credit: SciEng | SE. —F. (F.) Tucker

**106. Domestic Animal Behavior Laboratory (2)**

Laboratory—6 hours. Prerequisite: course 104 or Neurobiology, Physiology, and Behavior 102 or consent of instructor. Research experience with the behavior of large domestic animals. Experimental design, methods of data collection and analysis, and reporting of experimental results. GE credit: SciEng, Wrt | QL, SE, SL, VL, WE. —W. (W.) Tucker

**112. Sustainable Animal Agriculture (3)**

Lecture/discussion—3 hours. Prerequisite: course 1 or Biological Sciences 2B; Statistics 100 or Plant Sciences 120 recommended. Current applications of sustainable animal agriculture including the challenges of animal production, animal needs, animal well-being, and protection of the environment and resources for future food supply systems. Various scenarios for meeting sustainability objectives are evaluated using computing modeling. GE credit: SciEng or SocSci | OL, QL, SE or SS. —S. (S.) Kebread

**115. Advanced Horse Production (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 15, 100 or Neurobiology, Physiology, and Behavior 101, Biological Sciences 101, Nutrition 115; or consent of instructor. Feeding, breeding, and management of horses; application of the basic principles of animal science to problems of production of all types of horses. Designed for students who wish to become professionally involved in the horse industry. GE credit: SciEng | QL, SE, SL, WE. —F. (F.) F.

**118. Fish Production (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Wildlife, Fish, and Conservation Biology 120. Current practices in fish production; relationship between the biological aspects of a species and the production systems, husbandry, management, and marketing practices utilized. Emphasis on species currently reared in California. GE credit: SciEng | SE.

**119. Invertebrate Aquaculture (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 2B. Management, breeding and feeding of aquatic invertebrates; application of basic principles of physiology, reproduction, and nutrition to production of mollusks and crustaceans for human food; emphasis on interaction of species biology and managerial techniques on production efficiencies. GE credit: SciEng | SE.

**120. Principles of Meat Science (3)**

Lecture—3 hours. Prerequisite: course 2. Restricted to upper division standing. Anatomical, physiological, developmental, and biochemical aspects of muscle underlying the conversion of muscle to meat. Includes meat processing, preservation, microbiology, and public health issues associated with meat products. (Same course as Food Science and Technology 120.) GE credit: SciEng | SE.

**120L. Meat Science Laboratory (2)**

Discussion—1 hour; laboratory—3 hours. Prerequisite: course 2, 120 can be concurrent. Restricted to upper division standing. Laboratory exercises and student participation in transformation of live animal to carcass and meat, structural and biochemical changes related to meat quality, chemical and sensory evaluation of meat, and field trips to packing plant and processing plant. GE credit: SciEng | SE.

**123. Animal Growth and Development (4)**

Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: course 100 or Neurobiology, Physiology, and Behavior 101, Animal Biology 103 or Biological Sciences 103. Growth and development of ani-

mals from conception to maturity, viewed from practical and biological perspectives; includes genetic, metabolic, nutritional control of cell and organism function. GE credit: SciEng | OL, QL, SE, VL, WE. —S. (S.) Ross

**124. Lactation (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100 or Neurobiology, Physiology, and Behavior 101, Animal Biology 103 can be concurrent. Consideration of the biochemical, genetic, physiological, nutritional, and structural factors relating to mammary gland development, the initiation of lactation, the composition of milk and lactational performance. GE credit: SciEng, Wrt | SE, SL. —W. (W.) Hovey

**125. Equine Exercise Physiology (3)**

Lecture—3 hours. Prerequisite: course 15, 100 or Neurobiology, Physiology, and Behavior 101. Basic and applied physiology of the exercising horse. Includes physiological systems, gait analysis, lameness, pharmacology, sports medicine; sport horse performance evaluation and conditioning. Offered in alternate years. GE credit: SciEng | SE. —S.

**127. Advanced Equine Reproduction (3)**

Lecture—3 hours. Prerequisite: course 115; 100 or Neurobiology, Physiology, and Behavior 101. Reproductive physiology, anatomy and endocrinology of the mare and stallion. Emphasis on structure/function relationships as they are applied to improving equine reproductive management and efficiency. GE credit: SciEng | SE, WE. —S. (S.)

**128. Agricultural Applications of Linear Programming (4)**

Lecture—2 hours; laboratory—2 hours; discussion—1 hour. Prerequisite: Plant Sciences 21 or Engineering Computer Science 15 or consent of instructor. Restricted to upper division standing. Applications of linear programming in agriculture, emphasizing resource allocation problems and decision making. Problems include crop production, ration formulation, and farm management. Hands-on experience in developing linear programs and interpreting the results. GE credit: SciEng | QL, SE, SL. —W. (W.) Fadel

**129. Environmental Stewardship in Animal Production Systems (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 10 or 1A and 1B, Chemistry 2A, 2B, 8A, 8B. Class size limited to 24 students. Management principles of environmental stewardship for grazing lands, animal feeding, operations and aquaculture operations; existing regulations, sample analyses, interpretation and utilization of data, evaluation of alternative practices, and policy development. Offered in alternate years. GE credit: SciEng | SE, SL. —W. (W.) Meyer

**131. Reproduction and Early Development in Aquatic Animals (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Molecular and Cellular Biology 150 and Wildlife, Fish and Conservation Biology 120; or consent of instructor. Physiological and developmental functions related to reproduction, breeding efficiency and fertility of animals commonly used in aquaculture. GE credit: SciEng | SE, WE.

**136. Techniques and Practices of Fish Culture (3)**

Lecture—1 hour; laboratory—6 hours. Prerequisite: general biology and chemistry; course 2. Daily care and maintenance of fish in residential aquariums, research and commercial facilities. Biological and environmental factors important to sound management of fish. Laboratories focus on fish culture including growth trials and biochemical assays. Not open for credit to students who have previously completed course 136A or 137. GE credit: SciEng, Wrt | QL, SL, VL, WE. —F. (F.) Hung

**137. Techniques and Practices of Avian Culture (3)**

Lecture—1 hour; laboratory—6 hours. Prerequisite: basic understanding of general biology and chemistry; course 2. Not open for credit to students who

have previously completed course 136B or 137. Daily care and maintenance of birds for research, commercial production and companion or hobby uses. Biological and environmental factors important to sound management of birds. Laboratories focus on bird husbandry, management and care and include growth trials and biochemical assays. GE credit: SciEng | QL, SE, SL, VL, WE. —S. (S.) Hung

### **139. Experimental Animal Physiology (3)**

Lecture—1 hour; laboratory—3 hours; fieldwork—3 hours. Prerequisite: Animal Biology 102, Biological Sciences 101, or consent of instructor. Restricted to seniors in the Animal Science and Animal Science and Management majors. Combination of theory and hands-on experiences in animal physiology using various experimental techniques. Practical laboratory skill development from cellular level to whole animal, in areas such as genetics, endocrinology, histology and physiological function. GE credit: SciEng | SE, WE. —S. (S.)

### **140. Management of Laboratory Animals (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100 or Neurobiology, Physiology & Behavior 101. Laboratory animal management procedures in view of animal physiology, health and welfare, government regulations, and experimental needs. Clinical techniques using rodents and rabbits as models. GE credit: SciEng | SE. —F. (F.)

### **141. Equine Enterprise Management (4)**

Lecture/discussion—4 hours. Prerequisite: course 115; Economics 1A, 1B recommended. Examination of the concepts and principles involved in the operation of an equine enterprise. Essential aspects of equine enterprise management, including equine law, marketing, cash flow analysis, and impact of state and federal regulations. Offered in alternate years. GE credit: SocSci, Wrt | SS. —W.

### **142. Companion Animal Care and Management (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 42, Biological Sciences 101, course 100 or Neurobiology, Physiology, and Behavior 101; Animal Biology 102 or Biological Sciences 102 and Animal Biology 103 or Biological Sciences 103 recommended. Management and production of companion animals. Integration of the disciplinary principles of behavior, genetics, nutrition, and physiology as related to the care of companion animals. GE credit: SciEng | OL, QL, SE, SL, VL, WE. —F. (F.) Oberbauer

### **143. Pig and Poultry Care and Management (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 41, Nutrition 115, course 100 or Neurobiology, Physiology, and Behavior 101 or consent of instructor. Care and management of swine, broilers and turkeys as related to environmental physiology, nutrition and metabolism, disease management and reproduction. Saturday field trips. Offered in alternate years. GE credit: SciEng | SE, SL. —(F.) King, Petley

### **144. Beef Cattle and Sheep Production (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 41, Nutrition 115 or consent of instructor; Animal Genetics 107 recommended. Genetics, physiology, nutrition, economics and business in beef cattle and sheep production. Resources used, species differences, range and feedlot operations. Emphasis on integration and information needed in methods for management of livestock enterprises. One or two Saturday field trips. GE credit: SciEng | OL, QL, SE, SL, VL, WE. —S. (S.) Sainz, Zinn

### **145. Meat Processing and Marketing (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 2; consent of instructor. Distribution, processing and marketing of meat and meat products. Meat and meat animal grading and pricing. Government regulations and social/consumer concerns. Future trends and impact on production management practices. Includes poultry. GE credit: SciEng | SE.

### **146. Dairy Cattle Production (5)**

Lecture—3 hours; laboratory—3 hours; fieldwork—1 hour; discussion—1 hour. Prerequisite: Nutrition 115, or consent of instructor; Animal Genetics 107 recommended. Scientific principles from genetics, nutrition, physiology, and related fields applied to conversion of animal feed to human food through dairy animals. Management and economic decisions are related to animal biology considering the environment and animal well-being. Mandatory Saturday field-trip. GE credit: SciEng, Wrt | OL, QL, SE, SL, VL, WE. —S. (S.) DePeters

### **147. Dairy Processing and Marketing (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 146 or consent of instructor. Examination of distribution systems, processing practices, product quality, impact of government policy (domestic and foreign), marketing alternatives, and product development. GE credit: SciEng | SE.

### **148. Enterprise Analysis in Animal Industries (4)**

Lecture/discussion—4 hours. Restricted to students with upper division standing. Examination and application of decision making and problem solving in the production enterprise. The areas of production analysis, problem solving, risk analysis and cost-benefit analysis will be examined in terms of the total enterprise. GE credit: SocSci, Wrt | OL, QL, SS, WE. —S. (S.) Petley

### **149. Farrier Science (3)**

Lecture—3 hours. Prerequisite: course 115. In-depth examination of the structure-function relationship of the equine hoof and how it relates to conformation, injury and performance. Offered irregularly. GE credit: SciEng | SE.

### **149L. Farrier Science Laboratory (1)**

Laboratory—3 hours. Prerequisite: course 149 (may be taken concurrently) or consent of instructor. Art and science of horseshoeing in equine related fields. Proper use of the tools, materials and techniques in the fabrication of shoes and safe preparation of the hoof for application of shoes. (P/NP grading only)

### **170. Ethics of Animal Use (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: any basic course in composition or speech, or completion of college English requirement. Ethical issues relating to animal use in contemporary society. Integration of philosophical theories with scientific evidence relating to animal behavior, mentality, and welfare. Uses of animals in agriculture, research, and as companions. Ethical responsibilities regarding wildlife and the environment. GE credit: SocSci, Wrt | SL, SS, WE. —S. (S.) Makagon

### **190C. Research Group Conference (1)**

Discussion—1 hour. Prerequisite: advanced standing; consent of instructor. Weekly conference on research problems, progress and techniques in the animal sciences. May be repeated for credit. (P/NP grading only.) —F, W, S. (F, W, S.)

### **192. Internship in Animal Science (1-12)**

Internship—3–36 hours. Prerequisite: completion of 84 units and consent of instructor. Internship off and on campus in dairy, livestock and aquaculture production, research and management; or in a business, industry, or agency associated with these or other animal enterprises. All requirements of Internship Approval Form must be met. (P/NP grading only.) —F, W, S. (F, W, S.)

### **194. Research in Animal Science (3)**

Laboratory—6 hours; discussion—1 hour. Prerequisite: course 106 or 133 or 135 or 136 or 137 or 139 or Animal Genetics 111 and consent of instructor. Research with a faculty mentor. Weekly discussion and laboratory on specific research topic. May include a seminar to research group. Choose from sections: (1) Animal Behavior; (2) Animal Genetics; (3) Animal Nutrition; (4) Animal Physiology. May be repeated for credit for a total of four times.—F, W, S. (F, W, S.)

### **194HA. Undergraduate Honors Thesis in Animal Science (4)**

Lecture—1 hour; laboratory—9 hours. Prerequisite: course 100 or Neurobiology, Physiology and Behavior 101, Animal Biology 103 or Biological Sciences 103; minimum cumulative GPA of 3.200 and selection by the Honors Selection Committee; consent of instructor. Students will carry out a research project (chosen from faculty-suggested or approved proposals) during the academic year under the guidance of a faculty member. Upon completion, student will write a thesis and present a public seminar describing his/her research. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | OL, SE.

### **194HB. Undergraduate Honors Thesis in Animal Science (4)**

Lecture—1 hour; laboratory—9 hours. Prerequisite: course 100 or Neurobiology, Physiology and Behavior 101, Animal Biology 103 or Biological Sciences 103; minimum cumulative GPA of 3.200 and selection by the Honors Selection Committee; consent of instructor. Students will carry out a research project (chosen from faculty-suggested or approved proposals) during the academic year under the guidance of a faculty member. Upon completion, student will write a thesis and present a public seminar describing his/her research. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | SE, VL.

### **194HC. Undergraduate Honors Thesis in Animal Science (4)**

Lecture—1 hour; laboratory—9 hours. Prerequisite: course 100 or Neurobiology, Physiology, and Behavior 101, Animal Biology 103 or Biological Sciences 103; minimum cumulative GPA of 3.200 and selection by the Honors Selection Committee; consent of instructor. Students will carry out a research project (chosen from faculty-suggested or approved proposals) during the academic year under the guidance of a faculty member. Upon completion, student will write a thesis and present a public seminar describing his/her research. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | SE, WE.

### **197T. Tutoring in Animal Science (1-2)**

Tutorial—1–2 hours. Prerequisite: Animal Science or related major; upper division standing; consent of instructor. Tutoring of students in lower division animal science courses; weekly conference with instructors in charge of courses; written critiques of teaching procedures. May be repeated one time for credit. (P/NP grading only.)

### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. Restricted to students with upper division standing. (P/NP grading only.)

### **Graduate**

### **200. Strategies in Animal Production (4)**

Lecture/discussion—4 hours. Prerequisite: consent of instructor. Examines the forces and issues in animal agriculture through the strategic management process.

### **206. Models in Agriculture and Nutrition (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 16B; Statistics 108. Basic model building principles and techniques for statistical and systems simulation models. Optimization techniques for non-linear experimental designs and management models are presented. Quantitative analysis and evaluation of linear and non-linear equations used in agriculture and nutrition.

### **259. Literature in Animal Science (1)**

Seminar—1 hour. Prerequisite: graduate standing. Critical presentation and analysis of recent journal articles in animal science. May be repeated for credit up to nine times. (S/U grading only.)

**290. Seminar (1)**

Seminar—1 hour. Reports and discussions of topics of interest in genetics, nutrition, and physiology as they apply to animal science. (S/U grading only.)—F, W, S. (F, W, S.)

**290C. Research Group Conference (1)**

Discussion—1 hour. Prerequisite: graduate standing. Weekly conference on research problems, progress and techniques in the animal sciences. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**291. Current Research in Animal Science (1)**

Seminar—1 hour. Prerequisite: graduate standing. Current research in animal science explored at weekly seminars presented by guest lecturers. Discussion of research presented. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**297. Supervised Teaching in Animal Science (2)**

Supervised teaching—6 hours. Prerequisite: consent of instructor. Practical experience in teaching Animal Science at the University level; curriculum design and evaluation; preparation and presentation of material. Assistance in laboratories, discussion sections, and evaluation of student work. An evaluation letter sent to the Graduate Adviser with a copy to the student. (S/U grading only.)—F, W, S. (F, W, S.)

**298. Group Study (1-5)**

Prerequisite: consent of instructor. (Sect. 1, 2, 3—letter grading; from Sect. 4 on—S/U grading only.)

**299. Research (1-12)**

(S/U grading only.)

## Animal Science and Management

(College of Agricultural and Environmental Sciences)

**Master Adviser.** J.G. Fadel

**Advising Center** for the major (including peer advising) is located in 1202 Meyer Hall 530-754-7915. Each student will be assigned a faculty adviser through this office upon entering the major. <http://asac.ucdavis.edu>

### The Major Program

The Animal Science and Management major combines a thorough education in the basic biology of domestic animal species with a strong background in agricultural economics. Graduates of this interdisciplinary major will be well positioned to adjust to our rapidly changing world and job market.

**The Program.** The interdisciplinary program in Animal Science and Management combines a fundamental background in the natural sciences (chemistry, biology, physiology, nutrition, genetics, mathematics, and behavior), with an understanding of economics and humanities. After completing preparatory courses, students focus on both the animal species that interest them (horses, cattle, sheep, companion animals, goats, fish, crustaceans or mollusks, among others) and principles of managerial economics (marketing, finance, business organization or systems analysis). Students preparing for medical or veterinary school can meet professional entrance requirements with those of this major if they plan ahead.

**Career Alternatives.** Job opportunities for successful graduates are plentiful and include positions with banking and financial institutions, agribusiness, Peace Corps, and farms of all scales. Most Animal Science and Management graduates are well prepared for professional study (medical, law, veterinary, and graduate business schools) as well as graduate research programs leading to the M.S. or Ph.D. degrees. Advanced degrees open doors to work as extension specialists, farm advisers, and teachers, and prepare students for international service.

### B.S. Major Requirements:

	UNITS
<b>Written and Oral Expression</b> .....	<b>8</b>
Select two courses (if not selected for English college requirement) from: Communication 130, 134, 135, 136, 140; Nematology 150; University Writing Program 101, 102A, 102B, 102C, 102D, 102E, 102F, 102G, 104A, 104B, 104C, 104D, 104E, 104F .....	8
<b>Preparatory Subject Matter</b> .....	<b>69-75</b>
Animal Science 1 and 2.....	8
Biological Sciences 2A, 2B, and 2C.....	15
Chemistry 2A, 2B, 8A, 8B.....	16
Plant Sciences 21 or Computer Science Engineering 15.....	3-4
Economics 1A, 1B; Management 11A, 11B.....	16
Mathematics 16A, 16B, and 16C or 17A-B-C or 21A-B-C .....	9-12
Plant Sciences 120, Statistics 100 or 103, or other courses in quantitative skills with prior approval of the Master Adviser .....	4

### Depth Subject Matter ..... 27-30

Biological Sciences 101 .....	4
Nutrition 115.....	4
Neurobiology, Physiology, and Behavior 101 .....	5
Business Management.....	14-17
Agricultural and Resource Economics 100A;	
One course from: Agricultural and Resource Economics 113, 130, 136, 138;	
One course from: Agricultural and Resource Economics 120, 132, 140, 145, 157;	
Plus one course from: Animal Science 128 or Agricultural and Resource Economics 155.	

### Area of Specializations ..... 14-16

Choose one area of specialization below:	
Aquatic Animals.....	16
Animal Science 18, 118 or 119, 131, and 148.	
Companion Animals .....	16
Animal Science 42, 140, 142, and 148.	
Dairy .....	15
Animal Science 41, 41L, 146, 147, and 148.	
Equine .....	15
Animal Science 15, 115, 141, and 148.	
Livestock.....	16
Animal Science 41, 41L, 143 or 144, 145, and 148.	
Poultry .....	15
Avian Sciences 11, Animal Science 143, 145, and 148.	
Individualized .....	14-16
Students may, with prior approval of their adviser and the Master Adviser, design their own individualized specialization within the major. The specialization will consist of 4 to 6 courses with one of the courses being Animal Science 148. The other courses will include an introduction, care and management, and processing and/or marketing aspects of the animal of interest.	

### Restricted Electives..... 8-10

At least two additional courses (minimum 8 units; duplicate from Depth courses not counted) selected with approval of adviser from: Agricultural and Resource Economics 18, 112, 113, 118, 120, 130, 132, 136, 138, 140, 142, 143, 144, 145, 150, 155, 157, 171A, 171B, 176; Animal Science 103, 104, 106, 115, 118, 119, 120, 120L, 123, 124, 125, 126, 127, 128, 129, 131, 136, 137, 140, 141, 142, 143, 144, 145, 146, 147, 149, 170, 192, 194, 194H; Avian Sciences 100, 103, 115, 121, 123, 149, 150; Animal Genetics 101, 105, 107, 111; Nutrition 122, 123, 123L, 124; Animal Biology 102 (strongly recommended); 103;	
---	--

Computer Science Engineering 124;  
Management 100; Neurobiology, Physiology, and Behavior 117, 121, 121L, 130;  
Wildlife, Fish, and Conservation Biology 120, 120L, 130.

**Total Units for the Major ..... 126-139**

## Anthropology

(College of Letters and Science)

James H. Smith, Ph.D., Chairperson of the Department

**Department Office.** 328 Young Hall  
530-752-0745;  
<http://www.anthropology.ucdavis.edu>

### Faculty

Monique Borgerhoff Mulder, Ph.D., Professor  
Timothy K. Choy, Ph.D., Associate Professor (*Science and Technology Studies*)

Damien Caillaud, Ph.D., Assistant Professor  
Margaret C. Crofoot, Ph.D., Assistant Professor  
Christyann M. Darwent, Ph.D., Associate Professor  
Marisol de la Cadena, Ph.D., Professor  
Donald L. Donham, Ph.D., Distinguished Professor  
Joseph Dumit, Ph.D., Professor (*Science and Technology Studies*)

Jelmer W. Eerkens, Ph.D., Professor  
Tarek Elhaik, Ph.D., Assistant Professor  
Cristiana Giordano, Ph.D., Associate Professor  
Lyne A. Isbell, Ph.D., Professor  
Academic Senate Distinguished Teaching Award

Jeffrey S. Kahn, Ph.D., Assistant Professor  
Suad Joseph, Ph.D., Distinguished Professor (*Women and Gender Studies*)

Alan Klima, Ph.D., Professor  
Suzana M. Sawyer, Ph.D., Associate Professor  
James H. Smith, Ph.D., Professor  
Smriti Srinivas, Ph.D., Professor  
Teresa E. Steele, Ph.D., Associate Professor  
Timothy D. Weaver, Ph.D., Associate Professor  
Li Zhang, Ph.D., Professor  
Nicolas Zwyns, Ph.D., Assistant Professor

### Emeriti Faculty

Robert L. Bettinger, Ph.D., Professor  
David J. Boyd, Ph.D., Professor Emeritus  
Richard T. Curley, Ph.D., Senior Lecturer Emeritus  
William G. Davis, Ph.D., Professor Emeritus  
Alexander H. Harcourt, Ph.D., Professor Emeritus  
Sarah B. Hrdy, Ph.D., Professor Emerita Member, National Academy of Sciences

Henry M. McHenry, Ph.D., Professor Emeritus  
UC Davis Prize for Undergraduate Teaching and Scholarly Achievement

David L. Olmsted, Ph.D., Professor Emeritus  
Peter S. Rodman, Ph.D., Professor Emeritus  
Janet S. Shibamoto-Smith, Ph.D., Professor  
David Glenn Smith, Ph.D., Professor  
Carol A. Smith, Ph.D., Professor Emerita  
Carolyn F. Wall, Ph.D., Senior Lecturer Emerita  
Bruce P. Winterhalder, Ph.D., Professor Emeritus  
Aram A. Yengoyan, Ph.D., Distinguished Professor Emeritus

### The Major Program

Anthropology is the systematic study of humans. The student of anthropology learns about human biology, ecology, and social life—past and present—and gains a broad understanding of humans and societies. It is a diverse field, and the courses, faculty, and degree programs at UC Davis are subdivided into two wings—*Evolutionary* and *Sociocultural*.

**Evolutionary.** Evolutionary anthropologists are united by their common application of science and evolutionary theory to understand the behavior, ecology, history, and evolution of humans and non-human primates, as individuals and as societies. These topics may be approached through archaeology, human behavioral ecology, molecular anthropology, paleoanthropology, primatology, genetics, biogeography, and conservation biology. Archaeo-

ogy is the study of the history or prehistory by analysis of a people's artifacts, or their material culture, with the goal of reconstructing culture history and human behavior. *Human behavioral ecology* is the study of how variation in ecology and social organization can help us understand variation in human behavior. *Paleoanthropology* is the study of human evolution through fossil and archaeological records, drawing on relevant studies in biological anthropology, Paleolithic archaeology, genetics, and geology. *Primateology* is the study of behavior, ecology, and morphology of primates to address questions about the evolution and function of behavioral and morphological patterns in nonhuman primates and to test models of the origins of human morphology and behavior. *Geneticists* can use DNA to address anthropological questions about population histories, migrations, mixing, and adaptations to local contexts. *Biogeography* investigates the biology behind the geographic distribution of species and human cultures. *Conservation biology* explores the causes of loss of biological diversity—in this department, it focuses on threatened non-human primates and the conservation of natural resources by a rapidly growing population.

**Sociocultural.** *Sociocultural anthropologists* study the varied ways in which people around the world organize their lives and interpret the circumstances in which they operate. Their main method is extended field research, which combines attention to global issues with the close study of human relations and culture. Among the themes addressed in the department's undergraduate courses are globalization and transnationalism; human ecology and environmental change; cultures of healing, health and medicine, the global spread of media and technology; migration, multiculturalism and urban life; colonialism and neocolonialism development and post-development; race, class and gender; politics and the political; cultures of everyday life; language use and discourse; and self, identity and family. The track in sociocultural anthropology thus offers a rich set of resources for understanding and engaging pressing issues in a globalizing world characterized by new forms of international culture and community as well as by increasing material inequality and political volatility.

**The Program.** The Bachelor of Arts program is divided into two tracks, *Sociocultural* and *Evolutionary*, which parallel the two wings described above. Students interested in the study of recent and contemporary human languages and societies should follow the Sociocultural Track. To obtain a A.B. degree in sociocultural anthropology, each student is required to complete courses that provide (1) foundational skills, (2) language and cultural skills, (3) comprehensive skills, and (4) specialized skills. Students interested in the study of archaeology; primate studies; or human biology, ecology or origins should follow the Evolutionary Track. The B.A. degree offered by the Evolutionary Track provides general training in anthropology from an evolutionary perspective. The Evolutionary Track also offers a B.S. degree that requires lower division coursework in math and science and upper division coursework in biological anthropology and closely related disciplines.

Students in both tracks are encouraged to gain practical experience through courses taken while studying abroad (under the administration of the UC Davis Study Abroad) and through undergraduate research or internships performed for credit (under ANT 192, 198, or 199 units provided by the advising office). Students showing exceptional ability are welcome to seek permission from instructors to participate in graduate seminars offered by the department.

**Career Opportunities.** A Bachelor of Arts degree in Anthropology is suited for students seeking a solid liberal arts education. With its broad goal to facilitate understanding across lines of cultural difference, sociocultural anthropology prepares students for lives that are influenced by increasingly pervasive cultural exchange, as well as cultural conflict,

around the world. The program serves as excellent preparation for careers in which inter-cultural skills are increasingly needed, including social and environmental activism, business, diplomacy and social administration, journalism, law, education and international relations. Students that focus on evolutionary processes will be well prepared to enter fields such as medical or health anthropology, museum studies, cultural resource management and wildlife conservation. A Bachelor of Science degree in Anthropology provides suitable training for a variety of health professions including pre-medical, pre-dental, and pre-veterinary training, and the educational background for further training in the biological/evolutionary sciences and forensic investigation. The A.B. or B.S. degree in anthropology with appropriate courses in education is good preparation for high school teaching in social, biological and natural sciences. An anthropology degree also provides the foundation for advanced study leading to careers in college-level teaching and research.

## A.B. Major Requirements:

	UNITS
<b>Evolutionary Emphasis:</b>	
<b>Preparatory Subject Matter</b> .....19-21	
Anthropology 1, 2, 3 .....	12
Anthropology 15, 23, 24, 25, 28, 50, or 54.....	4-5
Anthropology 13, Sociology 46B, or Statistics 13, 32, 100 or 102.....	3-4
<b>Depth Subject Matter</b> .....42-47	
Two courses from:	
Anthropology 101, 102, 103, 105, 122A, 128A, 141B, 141C, 154A, 154B, 154C, 154CL, 158, 178.....	7.9
Anthropology 153, 157, or 159.....	3-5
Anthropology 151 or 152.....	4-5
One course from:	
Anthropology 170, 171, 172, 173, 174, 175, 176, 177, 179, 180, 182, 183, 184 or 185.....	4
One course from:	
Anthropology 100, 102, 104N, 109, 110, 117, 120, 121, 122B, 123AN, 124, 125A, 125B, 126A, 126B, 127, 128B, 129, 130A, 131, 132, 134, 136, 137, 138, 139AN, 139BN, 140A, 140B, 141B, 141C, 142, 143A, 144, 145, 146N, 148A, 149A, 149B, 186A .....	4
Select 20 additional units from any upper division evolutionary track Anthropology courses (see list below) chosen in consultation with an evolutionary track undergraduate adviser .....	20
<b>Total Units for the Major</b> .....62-69	

Note: Evolutionary track courses at the upper division level are courses 101, 102, 103, 105, 122A, 128A, 141B, 141C, and 151 to 186A

## Sociocultural Emphasis:

	20-22
Anthropology 2 .....	4
Two courses from: Anthropology 1, 3, or 4.....	8
Select one of the following two options:	
(1) Two additional quarters of the foreign language used to meet the L&S language requirement .....	8-10
(2) Two additional lower division sociocultural track courses .....	8-10
<b>Depth Subject Matter</b> .....42-46	
Anthropology 100 .....	4
Two upper division area-focus sociocultural track courses from the following:	
Anthropology 140A, 140B, 141C, 142, 143A, 144, 145, 146N, 148A, 149A, 149B.....	8
Select one of the following two options in consultation with sociocultural track undergraduate adviser (see list below identifying upper division sociocultural	

courses; see list above identifying  
evolutionary track courses):

- (1) Eight additional upper division anthropology courses (two courses may be in the evolutionary track; and up to six units can be Anthropology 192 internship units) ..... 30-34
- (2) Eight additional upper division courses that may combine six sociocultural track courses and either 8 units of Study Abroad credit or two related courses in a single academic discipline (including but not limited to: African American and African Studies, American Studies, Art Studio, Art History, Asian American Studies, Chicana/o Studies, Communication, Community and Regional Development, Economics, East Asian Studies, History, Linguistics, Music, Native American Studies, Nature and Culture, Philosophy, Political Science, Psychology, Religious Studies, Sociology, Textiles and Clothing, Theatre and Dance, Women and Gender Studies) ..... 30-34

## Total Units for the Major ..... 62-68

Note: Sociocultural track courses at the upper division level are those with numbers from 100 to 149B, with the exception of 101, 103, 105, 128A, and 141B. Area-focus sociocultural track courses are those that refer in their titles to one or more peoples or regions of the world.

## B.S. Major Requirements:

	UNITS
<b>Evolutionary Emphasis:</b>	
<b>Preparatory Subject Matter</b> .....54-60	
Anthropology 1, 2, 3 .....	12
Biological Sciences 2A, 2B, 2C.....	14
Chemistry 2A, 2B, and 8A, 8B, or 118A, 118B.....	16-18
Mathematics 16A-16B-16C or 17A-17B-17C or 21A-21B-21C.....	9-12
Anthropology 13, Sociology 46B, Statistics 13, 32, 100, or 102.....	3-4
<b>Depth Subject Matter</b> .....45	
Anthropology 151 or 152 .....	4.5
Anthropology 153, 157, or 159 .....	3.5
Anthropology 154A or 154B .....	5
Three additional courses in anthropology chosen in consultation with evolutionary track undergraduate adviser .....	8-12
Biological Sciences 101 .....	4
Evolution and Ecology 100 .....	4
Additional units from the list below to achieve a minimum of 45 upper division units .....	10-14
Anthropology 101, 102, 103, 105, 122A, 128A, 151, 152, 153, 154A 154B, 154C, ANT 154CL, 156, 157, 157L, 158, 159, 180, 182, 185; Anatomy, Physiology and Cell Biology 100; Biological Sciences 102, 103; Cell Biology and Human Anatomy 101, 101L; Environmental Science and Policy 100; Evolution and Ecology 101, 102, 103, 104, 105, 138, 141, 147, 149, 175; Exercise Science 103, 115; Geology, 107, 107L, 108, 144, 146; History and Philosophy of Science 131; Molecular and Cellular Biology 120L, 121, 150, 150L, 160L, 161, 162, 163, 164; Neurobiology, Physiology, and Behavior 101, 101L, 102, 123, 124, 150, 152; Psychology 101, 113, 121, 122, 123, 124; Statistics 104, 106, 108, 130A, 130B; Wildlife, Fish, and Conservation Biology 141, 154	

## Total Units for the Major ..... 99-105

### Recommended

Anthropology 5, 15, 50; Geology 1; Psychology 1

**Major Advisers.** Consult Department office.

**Minor Program Requirements:**

UNITS

**Anthropology ..... 18-30****General emphasis ..... 19-21**

One course from: Anthropology 101, 102, 103, 105, 122A, 128A, 151, 152, 153, 154A, 155, 156, 157, 158, 159.....3-5  
 One course from: Anthropology 170, 171, 172, 173, 174, 176, 177, 179, 180, 182, 183, 184, 185.....4

One course from: Anthropology 140A through 149B, 178 or any other sociocultural track course that refers in its title to one or more peoples or regions of the world.....4  
 Two courses from: Anthropology 100 through 139BN, excluding 101, 103, 105, 128A, and 141B.....8

**Archaeology emphasis ..... 20-25**

Anthropology 170.....4  
 Two courses from: Anthropology 172, 173, 174 175, 176, 177, 178, or 179 .....8  
 Two courses from: Anthropology 156A, 156B, 171, 180, 181, 182, 183, 184, or 185 .....8-13

**Evolutionary emphasis ..... 18-30**

Any five upper division Evolutionary Anthropology courses chosen in consultation with an evolutionary track adviser.

**Sociocultural emphasis ..... 19-21**

Anthropology 100.....4  
 One upper division area-focus sociocultural track course .....4  
 (area-focus sociocultural track courses are those that refer in their titles to one or more peoples or regions of the world)  
 Two courses from: Anthropology 102 through 139BN, excluding 103, 105, and 128A.....8  
 One additional upper division Anthropology course chosen in consultation with sociocultural track undergraduate adviser.....3-5

**Minor Advisers.** Consult Department office in 1282 Social Sciences & Humanities.

**Honors Program.** Candidates for high or highest honors in Anthropology must write a senior thesis under the direction of a faculty member. The thesis project will have a minimum duration of two quarters. Honors candidates must take at least six units of Anthropology 194H. Only students who, at the end of their junior year (135 units), have attained a cumulative grade point average of 3.500 in Anthropology courses will be eligible for the honors program. The quality of the thesis work will be the primary determinant for designating high or highest honors at graduation.

**Teaching Credential Subject Representative.** \_\_\_\_\_; see the Teaching Credential/M.A. Program on page 124.

**Graduate Study.** The Department offers a program of study leading to the M.A. and Ph.D. degrees in Anthropology. Further information regarding graduate study may be obtained at the Department office and at Graduate Studies.

**Courses in Anthropology (ANT)****Lower Division****1. Human Evolutionary Biology (4)**

Lecture—3 hours; discussion—1 hour. Processes and course of human evolution; primatology; biological and social diversity within Homo sapiens; human paleontology. GE credit: SciEng, Div, Wrt | SE, SL, WE.—F, W, S, Su. (F, W, S, Su.)

**1Y. Human Evolutionary Biology (4)**

Web virtual lecture—2 hours; lecture/discussion—1 hour; laboratory/discussion—1 hour. Evolutionary theory and mechanisms of evolution; basic population and quantitative genetics; primatology; biological and cultural diversity within Homo sapiens;

paleoanthropology. Students may not take both course 1 and course 1Y for credit. GE credit: SE, WE.—W. (W.) Weaver

**2. Cultural Anthropology (4)**

Lecture—3 hours; discussion—1 hour. Introduction to cultural diversity and the methods used by anthropologists to account for it. Family relations, economic activities, politics, gender, and religion in a wide range of societies. Current problems in tribal and peasant societies. GE credit: SocSci, Div, Wrt | ACGH, DD, SS, WC, WE.—F, W, S, Su. (F, W, S, Su.)

**3. Introduction to Archaeology (4)**

Lecture—3 hours; discussion—1 hour. Development of archaeology as an anthropological study; objectives and methods of modern archaeology. GE credit: SciEng or SocSci, Div | SE or SS, SL.—F, W, S. (F, W, S.)

**4. Introduction to Anthropological Linguistics (4)**

Lecture—3 hours; discussion—1 hour. Exploration of the role of language in social interaction and world view, minority languages and dialects, bilingualism, literacy, the social motivation of language change. Introduction of analytical techniques of linguistics and demonstration of their relevance to language in sociocultural issues. Offered in alternate years. GE credit: SocSci, Div, Wrt | SS, WC, WE.

**5. Proseminar in Biological Anthropology (4)**

Seminar—3 hours; term paper. Prerequisite: course 1 or course 1Y recommended; and consent of instructor. Course primarily for majors. Integration of related disciplines in the study of biological anthropology through discussion and research projects. Principal emphasis in human adaptation to the environment. Offered irregularly. GE credit: SciEng, Wrt | SE, OL, WE.—Isbell

**13. Scientific Method in Physical Anthropology (4)**

Lecture—2 hours; laboratory/discussion—1 hour; fieldwork—1 hour. Skills for scientific thinking; designing, implementing, analyzing, interpreting, presenting, and criticizing research. Collection and analysis of original data. Basic statistical methods. GE credit: SciEng or SocSci, Wrt | OL, SE, VL, WE.

**15. Behavioral and Evolutionary Biology of the Human Life Cycle (5)**

Lecture—3 hours; discussion—1 hour; term paper. Introduction to the biology of birth, childhood, marriage, the family, old age, and death. Examines comparative characteristics of nonhuman primates and other animals as well as cross-cultural variation in humans by study of selected cases. GE credit: SciEng, Div, Wrt | SE, SL, WE.—Crofoot

**20. Comparative Cultures (4)**

Lecture—3 hours; discussion—1 hour. Introduction to the anthropological study of cultural diversity. Case studies of eight societies will be presented to illustrate and compare the distinctive features of major cultural regions of the world. Concludes with a discussion of modernization. GE credit: ArtHum or SocSci, Div | ACGH, AH or SS, DD, WC, WE.—Sawyer

**23. Introduction to World Prehistory (4)**

Lecture—3 hours; discussion—1 hour. Broadly surveys patterns and changes in the human species' physical and cultural evolution from earliest evidence for "humanness" to recent development of large-scale complex societies or "civilizations." Lectures emphasize use of archaeology in reconstructing the past. GE credit: SocSci, Div, Wrt | SS, WC, WE.

**24. Ancient Crops and People (4)**

Lecture—3 hours; discussion—1 hour. The archaeological evidence for domestication of plants and the origins of agricultural societies. Anthropological context of agriculture and the effects on sexual division of labor, social inequality, wealth accumulation, warfare, human health, and sedentism. Offered in alternate years. GE credit: SocSci, Div, Wrt | SS, WC, WE.—Eerkens

**25. Ancient Animals and People (2)**

Lecture—2 hours. History of human and animal relationships and how animals have influenced social and economic structures of past societies. Why, when and how humans used animals in the context of hunting, domestication, secondary products, ritual, companionship, and conservation. Offered in alternate years. GE credit: SocSci | SS.—Darwent, Steele

**26. Mummies of the Ancient World (2)**

Lecture—2 hours. Archaeological approaches for studying mummies and the process of mummification in the ancient world. Analytical techniques used, environmental factors promoting mummification, and archaeological conservation of mummified bodies. Offered in alternate years. GE credit: SS, WC.—F. Eerkens

**28. Prehistoric Origins of Art (2)**

Lecture/discussion—2 hours. Interdisciplinary look at the earliest evidence for art and symbolic behavior. Method and techniques to investigate Prehistoric art. Interpretative framework and relevance for understanding the role of symbolic activities in traditional societies. Offered in alternate years. GE credit: SocSci | SS.—Zwyns

**29. Vikings (2)**

Lecture—2 hours. History of the Vikings through the Slavic and Mediterranean regions in the East and across the vast North Atlantic region to the west. Emphasis on archaeology and sagas to understand Viking culture from the 8th to 11th centuries. Offered in alternate years. GE credit: SS, WC.—S. (S.) Darwent

**30. Sexualities (4)**

Lecture/discussion—4 hours. Introduction to the study of sexuality, particularly to the meanings and social organization of same-sex sexual behavior across cultures and through time. Biological and cultural approaches will be compared, and current North American issues placed in a wider comparative context. GE credit: ArtHum or SocSci, Div | ACGH, AH or SS, DD, WC.—Donham

**32. Drugs, Science and Culture (4)**

Lecture—3 hours; discussion—1 hour. Drugs, politics, science, society in a cultural perspective: emphasis on roles of science, government and the media in shifting attitudes toward alcohol, marijuana, Prozac and other pharmaceuticals; drug laws, war on drugs and global trade in sugar, opium, cocaine. (Same course as Science and Technology Studies 32.) GE credit: SocSci, Div, Wrt | SS, VL, WE.—Dumit

**34. Cultures of Consumerism (4)**

Lecture/discussion—4 hours; term paper. Aspects of modern consumer cultures in capitalist and socialist countries. Transformations of material cultures over the past century. Case studies on the intersections of gender, class, and culture in everyday consumption practices. Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WC.

**50. Evolution and Human Nature (4)**

Lecture—3 hours; discussion—1 hour. Evolutionary analyses of human nature, beginning with Lamarck, Darwin, Spencer and contemporaries, and extending through social Darwinism controversies to contemporary evolutionary anthropology research on human diversity in economic, mating, life-history, and social behavior. Offered in alternate years. GE credit: SciEng or SocSci, Div, Wrt | SE or SS, SL, WE.

**54. Introduction to Primatology (4)**

Lecture/discussion—3 hours; term paper. Basic survey of the primates as a separate order of mammals; natural history and evolution of primates; consideration of hypotheses for their origin. GE credit: SciEng | SE, SL, WE.—S. (S.) Isbell

**98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Lower Division****Students (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division****100. Theory in Social-Cultural Anthropology (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. Discussion of the theoretical and philosophical developments in cultural anthropology from the 19th century to the present. Not open for credit to students who have completed course 137. GE credit: SocSci | SS, WE.—F. (F.) Donham

**101. Ecology, Nature, and Society (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2 or Environmental Science & Policy 30 or Evolution and Ecology 100 or Biological Sciences 101 recommended. Interdisciplinary study of diversity and change in human societies, using frameworks from anthropology, evolutionary ecology, history, archaeology, psychology, and other fields. Topics include population dynamics, subsistence transitions, family organization, disease, economics, warfare, politics, and resource conservation. (Same course as Environmental Science and Policy 101.) Offered in alternate years. GE credit: SocSci, Div, Wrt | SS, WC, WE.—Borgerhoff, Mulder

**103. Indigenous Peoples and Natural Resource Conservation (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or Geology 1 or Environmental Science and Policy 30 recommended. Integration of the interests of resident and indigenous peoples with the conservation of natural resources and ecosystems, using case study examples from both the developing and the developed world. Not open for credit to students who have completed course 121N. (Former course 121N.) Offered in alternate years. GE credit: SocSci | ACGH, DD, OL, SS, WC, WE.—Mulder

**104N. Cultural Politics of the Environment (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. Relationship between social inequality (based on race, class, and/or gender) and ecological degradation. Articulation of local peoples, national policy, and the international global economy in the contestation over the use of environmental resources. Not open for credit to students who have completed course 134N. (Former course 134N.) GE credit: SocSci, Div | ACGH, DD, SS, WC, WE.—Sawyer

**105. Evolution of Societies and Cultures (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2 or Environmental Science and Policy 30 or Evolution and Ecology 100 or Biological Sciences 101 recommended. Interdisciplinary study of social and cultural evolution in humans. Culture as a system of inheritance, psychology of cultural learning, culture as an adaptive system, evolution of mal-adaptations, evolution of technology and institutions, evolutionary transitions in human history, coevolution of genetic and cultural variation. Only two units of credit to students who have completed Environmental Science and Policy 101 or course 101 prior to fall 2004. (Same course as Environmental Science and Policy 105.) Offered irregularly. GE credit: SocSci, Wrt | QL, SS, WC, WE.

**109. Visualization in Science: A Critical Introduction (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 2 or Science & Technology Studies 1 or Science & Technology Studies 20 recommended. Anthropological approaches to scientific visualization techniques, informatics, simulations. Examination of different visualization techniques toward understanding the work involved in producing them, critical assessment of their power and limits, especially when visualizations are used socially to make claims. (Same course as Science & Technology Studies 109.) Offered in alternate years. GE credit: SocSci, Wrt | SS, VL, WE.—Dumit

**110. Language and Sociocultural Anthropology (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. The role of language analysis and linguistic theory in the development of sociocultural anthropology. Language, culture, and thought; the linguistic accomplishment of social action; language ideology; language and social power. Language as cultural mediator of politicoeconomic process. GE credit: SocSci, Div, Wrt | SS, WC, WE.

**117. Language and Society (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 4 or Linguistics 1 recommended; course 2 recommended. Consideration of language in its social context. Methods of data collection and analysis; identification of socially significant linguistic variables. Contributions of the study of contextualized speech to linguistic theory. Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WC, WE.

**120. Language and Culture (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 4 or Linguistics 1 recommended; course 2 recommended. Culture, cognition, meaning, and interpretation; language and the classification of experience; communication and learning in crosscultural perspective. GE credit: SocSci, Div, Wrt | ACGH, DD, SS, WC, WE.

**121. Special Topics in Medical Anthropology (4)**

Lecture/discussion—4 hours. Prerequisite: course 2 recommended. Introduction to critical medical anthropology. Topics include anthropological analysis of bio-medicine, psychiatry, systems of knowledge and healing, the body, emotions, and clinical encounters in a cross-cultural perspective. (Same course as Science and Technology Studies 121.) GE credit: SocSci, Div, Wrt | SS, WC, WE.—Giordano

**122A. Economic Anthropology (4)**

Lecture—3 hours; discussion—1 hour. Varieties of production, exchange, and consumption behavior in precapitalist economies, their interaction with culture and social-political organization, and the theories that account for these phenomena. The effects of capitalism on precapitalist sectors. Not open for credit to students who have completed course 122. (Former course 122.) GE credit: SocSci, Div, Wrt | ACGH, DD, SS, WC, WE.

**122B. Anthropology and Political Economy (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. Survey of anthropological approaches to the study of political organizations; inter-relationships among political institutions, economic infrastructures and cultural complexity. Not open for credit to students who have completed course 123A. (Former course 123A.) Offered in alternate years. GE credit: SocSci, Div, Wrt | SS, WC, WE.

**123AN. Resistance, Rebellion, and Popular Movements (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. Analysis of popular protest in Third World and indigenous societies ranging from covert resistance to national revolts. Comparative case studies and theories of peasant rebellions, millennial movements, social bandits, Indian "wars", ethnic and regional conflicts, gender and class conflicts. Not open for credit to students who have completed course 123B. (Former course 123B.) Offered irregularly. GE credit: SocSci | SS, WC, WE.

**124. Religion in Society and Culture (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Discussion of anthropological theories of religion with emphasis on non-literate societies. Survey of shamanism, magic and witchcraft, ritual and symbols, and religious movements. Extensive discussion of ethnographic examples and analysis of social functions of religious institutions. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

**125A. Structuralism and Symbolism (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Survey of anthropological approaches to understanding the logic of structuralism and symbolism in cultural analysis. Focus on how structural and symbolic interpretations relate to cultural and linguistic universals and to the philosophical basis of relativism in the social sciences. (Former course 125.) Offered irregularly. GE credit: SocSci, Div | SS, WC, WE.

**125B. Postmodernism(s) and Culture (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. The U.S.-European postmodern condition. "Modernity" as an incomplete project for subordinated groups. The economic, social, technological and political conditions leading to postmodern aesthetics, in comparison with postcolonialism, feminism and minority discourse. Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WC, WE.

**126A. Anthropology of Development (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. Theories of development and current critiques. Colonial legacies and post-colonial realities. Roles of the state and NGOs, population migrations, changing gender identities, cash-earning strategies, and sustainability issues. Stresses importance of cultural understandings in development initiatives. Case studies emphasizing non-industrial societies. Not open for credit to students who have completed course 126. (Former course 126.) GE credit: SocSci, Div, Wrt | SS, WC, WE.—Smith

**126B. Women and Development (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. Current Third World and Western development issues concerning women in agriculture, industry, international division of labor, political movements, revolutions, politics of health, education, family and reproduction. Impact of colonialism, capitalism, the world system, and international feminism on women and development. Not open for credit to students who have completed course 131. (Former course 131.) GE credit: SocSci, Div, Wrt | SS, WC, WE.—Su. (Su.)

**127. Urban Anthropology (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Survey of approaches to urban living: political structures, organization of labor, class relations, world views. The evolution of urban life and its contemporary dilemmas. Cross-cultural comparisons discussed through case studies. GE credit: SocSci, Div, Wrt | SS, WC, WE.—Srinivas, Zhang

**128A. Kinship and Social Organization (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. Comparative examination of personal kinship, descent, marriage, household and family organizations; the theories that account for variation, and recent advances in the treatment of these data. Not open for credit to students who have completed course 128. (Former course 128.) Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WC, WE.

**128B. Self, Identity, and Family (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. Exploration of self, identity, and family systems cross-culturally. Impact of class, gender, race, ethnicity, ruralization, urbanization, and globalization on notions of selfhood in different social/cultural systems. Not open for credit to students who have completed course 129. (Former course 129.) Offered in alternate years. GE credit: SocSci, Div, Wrt | SS, WC, WE.

**129. Health and Medicine in a Global Context (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 2 recommended. Recent works in medical anthropology and the science studies of medicine dealing with social and cultural aspects of global health issues such as AIDS, pandemics, clinical trials, cultural differences in illnesses, diabetes, organ trafficking, medical technologies, illness nar-

ratives, and others. (Same course as Science and Technology Studies 129.) GE credit: SocSci, Div, Wrt | SS, WC, WE.—Dumit

### **130A. Cultural Dimensions of Globalization (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. The cultural dimensions of recent economic and political developments frequently termed “globalization.” Offered in alternate years. GE credit: SocSci, Wrt | SS, WC, WE.

### **130BN. Migration and the Politics of Place and Identity (4)**

Lecture/discussion—4 hours. Prerequisite: course 2 recommended. Internal and international migration from an anthropological perspective, including causes, processes, and political, economic, and cultural effects of spatial mobility and displacement. Emphasizes the interplay of identity, place, and power in diverse cultural and historical contexts. Not open for credit to students who have completed course 123D. (Former course 123D.) Offered irregularly. GE credit: SocSci, Wrt | SS, WC, WE.

### **131. Ecology and Politics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. Analysis of the complex interactions between ecological dynamics and political processes employing the emerging approach of political ecology. Case studies of environmental degradation (e.g., desertification, logging, mineral extraction, petroleum, water) from various cultural and geographic regions. Offered in alternate years. GE credit: SocSci, Div | SS.

### **132. Psychological Anthropology (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 2 recommended. History of the relationship between anthropology and psychoanalysis. Exploration of anthropology of emotions, colonial psychology, contemporary ethno-psychiatry, studies on personhood, possession, magic, altered states, subjectivity, and definitions of the normal and the pathological in different contexts and cultures. GE credit: SocSci, Div, Wrt | SS, WC, WE.—Giordano

### **134. Buddhism in Global Culture (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. Class size limited to 50 students. Buddhist meditation and ritual as a cultural system that adapts to global and local forces of change. Anthropological theory and method in understanding global culture transmission, including Buddhist reform movements in Asia and Buddhist practice in the West. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.—Klima

### **136. Ethnographic Film (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. Overview of the use of film in anthropology and its advantages and limitations in comparison to written ethnographic descriptions. Essential features of ethnographic films. Film production in anthropological research and problems encountered in producing films in the field. Offered irregularly. GE credit: SocSci, Wrt | SS, VL, WC, WE.

### **137. Meditation and Culture (4)**

Lecture/discussion—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. Class size limited to 50 students. Study and practice of the relation between meditation and cultural conditioning; comparison of Buddhist practice with other cultural constructions of mind, body, brain, thought, emotion, and self.—Klima

### **138. Ethnographic Research Methods in Anthropology (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. Basic concepts in and approaches to ethnographic field research. Problem formulation, research design, qualitative and quantitative data collection procedures, and techniques for organizing, retrieving, and analyzing information. Ethnographic description and constructed inference. Students will organize and conduct individual research projects. Offered in alternate years. GE credit: SocSci | SS, WC, WE.—de la Cadena

### **139AN. Race, Class, Gender Systems (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. Comparative analysis of class/race/gender inequality, concentrating on the ways in which beliefs about descent, “blood,” and biological difference interact with property and marital systems to affect the distribution of power in society. Not open for credit to students who have completed course 139. (Former course 139.) Offered irregularly. GE credit: SocSci, Div, Wrt | ACGH, DD, SS, WC, WE.—de la Cadena

### **139BN. Gender and Sexuality (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. Gender and sexuality in foraging bands, horticultural and pastoral tribes, agricultural and industrial states. Debates on cultural evolution and distribution of gender hierarchies. Impact of politics, economics, religion, social practices, women's movements on gender and sexuality. Culture, nature, and sexuality. Not open for credit to students who have completed course 130. (Former course 130.) Offered irregularly. GE credit: SocSci, Div, Wrt | ACGH, DD, SS, WC, WE.

### **140A. Cultures and Societies of West and Central Africa (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. Ethnographic survey of West Africa and Congo Basin with analyses of representative societies which illustrate problems of general theoretical concern. Major consideration will be the continuities and discontinuities between periods prior to European contact and the present. Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WC, WE.

### **140B. Cultures and Societies of East and South Africa (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. Ethnographic survey of Eastern and Southern Africa with analyses of selected societies which illustrate problems of interest to anthropologists. Major consideration will be given to continuities and discontinuities between periods prior to European contact and the present. GE credit: SocSci, Div, Wrt | SS, WC, WE.—Donham

### **141B. Ethnography of California and the Great Basin (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended; consent of instructor. Description and analysis of the native peoples of California and the Great Basin, and their lifeways at the time of European contact. (Former course 141C.) GE credit: SocSci, Div, Wrt | ACGH, DD, SS, WE.—Beffinger

### **141C. People of the Arctic: Contemporary and Historic Cultures of the Circumpolar Region (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or 3 recommended. Social, economic, political, and religious lives of Russian, American, Canadian, and Greenlandic Arctic people (Yup'ik, Inupiat, Inuit). Topics include Arctic ecosystems, archaeological record of human occupation, ethno-historical and ethnographic accounts, arctic people in popular culture, and contemporary issues. Offered in alternate years.—F. Darwent

### **142. Peoples of the Middle East (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. Peoples of the Middle East (including North Africa). Discussions of class relations, kinship organization, sex/gender systems, religious beliefs and behavior, ethnic relations, political systems. Impact of world systems, political and religious movements and social change. (Former course 136.) GE credit: SocSci, Div, Wrt | SS, WC, WE.

### **143A. Ethnology of Southeast Asia (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. Patterns of culture and social organization from prehistory to the present, in the context of historical, ecological, economic, and political settings. Emphasis on the relation of ethnic minorities to national states. Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WC, WE.

### **144. Contemporary Societies and Cultures of Latin America (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Introduction to contemporary social structure of Latin America. Origins, maintenance and changes in inequality: economic responses to poverty, sociocultural responses to discrimination, and political responses to powerlessness. GE credit: SocSci, Div, Wrt | SS, WC, WE.—de la Cadena

### **145. Performance, Embodiment, and Space in South Asia (4)**

Lecture/discussion—4 hours. Prerequisite: course 2 or consent of instructor. South Asian cultures and societies with a focus on performance, embodiment, and space from several disciplinary fields. Topics may include colonialism, nationalism, religious traditions, media, popular culture, cities, social movements, modernity, body-cultures, identity, gender, and diasporas. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.—Srinivas

### **146N. Topics in the Anthropology of Europe (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. Recent ethnographies of different nation-states and socio-political spaces in Europe. Topics include the question of old and new boundaries, historical and contemporary constructions of Europe, migration and ethnicity, citizenship, belonging, multiculturalism, and post/socialisms. Offered in alternate years. GE credit: SocSci, Div, Wrt | SS, WC, WE.—Giordano

### **148A. Culture and Political Economy in Contemporary China (4)**

Lecture/discussion—4 hours. Prerequisite: course 2 recommended. Examining contemporary Chinese culture and political economy through reading ethnographic studies on recent transformations in rural and urban Chinese society. Special attention is given to state power, popular culture, spatial mobility, city space, and gender. GE credit: SocSci, Div, Wrt | SS, WC, WE.—Zhang

### **149A. Traditional Japanese Society (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 recommended. Patterns of culture and social organization from prehistoric to early twentieth-century Japan. Origins, prehistory, and traditional religious and political systems, marriage and kinship, language and culture. Changes and continuities in traditional and contemporary Japanese culture are addressed. Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WC, WE.

### **149B. Contemporary Japanese Society (4)**

Lecture—3 hours; discussion—1 hour. Introduction to contemporary Japanese social structure, social organization, and patterns of culture. Analysis of rural-urban cultural continuities and contrasts, class relations, political and economic systems, kinship, sex/gender systems, contemporary religious beliefs and behavior, conflict, consensus, and cultural stereotypes. Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WC, WE.—Shibamoto-Smith

### **151. Primate Evolution (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Biological Sciences 2B or Biological Sciences 2C or Evolution and Ecology 10 recommended. Origin and relationships of the prosimians, monkeys, and apes. GE credit: SciEng, Wrt | SE, WE.—S. (S.) Isbell

### **152. Human Evolution (5)**

Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: course 1 recommended. Nature and results of the evolutionary processes involved in the formation and differentiation of humankind. GE credit: SciEng, Wrt | SE, WE.—W. (W.) Zwyns

### **153. Human Biological Variation (5)**

Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: course 1 or Biological Sciences 2B recommended. Origin, adaptive significance and methods of analysis of genetic differences among human populations. Special attention given to racial differences such as those in blood groups, plasma pro-

teins, red cell enzymes, physiology, morphology, pigmentation and dermatoglyphics. GE credit: SciEng, Wrt | QL, SE, WE.—D. G. Smith

#### **154A. The Evolution of Primate Behavior (5)**

Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: course 1 or 54 or Evolution and Ecology 10 recommended. Examines ecological diversity and evolution of social systems of prosimians, monkeys, and apes, placing the social behavior of the primates in the context of appropriate ecological and evolutionary theory. GE credit: SciEng, Wrt | SE, VL, WE.—F. (F.) Isbell

#### **154B. Primate Evolutionary Ecology (5)**

Lecture—3 hours; lecture/discussion—1 hour; term paper. Prerequisite: course 1 or Evolution and Ecology 10 recommended. Examination of the ecology of primates within an evolutionary framework. Theoretical concepts in individual, population, and community ecology, illustrated with primate (and other vertebrate) examples, with additional discussion of primate and rainforest conservation. GE credit: SciEng, Wrt | QL, SE, WE.

#### **154C. Behavior and Ecology of Primates (2)**

Lecture/discussion—2 hours. Prerequisite: course 54, 154A, or 154BN; Statistics 13 or its equivalent. Scientific methods of studying, describing and analyzing the behavior and ecology of primates. (P/NP grading only.) Offered in alternate years. GE credit: SE.—S. (S.) Crofoot

#### **154CL. Laboratory in Primate Behavior (4)**

Laboratory—6 hours; term paper. Prerequisite: course 54, 154A, or 154BN; Statistics 13 or its equivalent. Design and conduct of scientific “field studies” of the behavior of group-living primates at the California National Primate Research Center Offered in alternate years. GE credit: SciEng | OL, SE, WE.—S. (S.) Crofoot

#### **156A. Human Osteology (4)**

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 1 or course 1Y recommended. Not open to students who have previously completed course 156. Human skeleton from archaeological, forensic, and paleontological perspectives, including anatomical nomenclature, variation with sex and age, function, evolution, growth, and development of bones and teeth. Hands-on study and identification of human skeletal remains. GE credit: SciEng | SE.—F. (F.) Weaver

#### **156B. Advanced Human Osteology (4)**

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 156A or equivalent. Not open to students who have previously completed course 156. Human skeletons from archaeological, forensic, and paleontological contexts. Bone and tooth structure, growth, and development; measurement, statistics, and biomechanics; assessment of age, sex, weight, height, and ancestry; and indicators of illness, injuries, diet, and activities. Offered in alternate years. GE credit: SciEng | SE.—S. (S.) Weaver

#### **157. Anthropological Genetics (3)**

Lecture—3 hours. Prerequisite: course 1 or Biological Sciences 2C recommended. Method and theory of genetic and genomic analysis of molecular evolution of human and non-human primate populations. Special attention to the molecular evolutionary transition to humans and genetic differences among extant human populations and their adaptive significance. Offered in alternate years. GE credit: SciEng | QL, SE.—D. G. Smith

#### **157L. Laboratory in Anthropological Genetics (2)**

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 1 or Biological Sciences 2C recommended; enrolled in course 157 concurrently or following. Methods for identifying genetic variation in human blood group antigens, serum proteins and red cell enzymes (hemagglutination), general electrophoresis on starch, cellulose acetate and polyacrylamide, immunodiffusion and immunoelectrophoresis on agarase. (P/NP grading only.) Offered irregularly. GE credit: QL, SE.—D. G. Smith

#### **158. The Evolution of Females and Males: Biological Perspective (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 recommended. Current theoretical frameworks for explaining the evolution of sex differences and for understanding the interrelationship between biological processes and cultural construction of gender roles. GE credit: SciEng, Div, Wrt | OL, WE.—Eerkens

#### **159. Molecular Anthropology of Native America (4)**

Seminar—3 hours; term paper. Prerequisite: course 1 or Biological Sciences 2B; or consent of instructor. Use of DNA and other genetic polymorphisms to test hypotheses regarding genetic relationships among different Native American tribal groups and about prehistoric population replacements and migrations to and within the Americas. Integration with craniometric, archaeological, paleoenvironmental, linguistic and ethnohistorical evidence. Offered irregularly. GE credit: SciEng | QL, SE.

#### **160. Neandertals and Modern Human Origins (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or course 1Y or equivalent recommended. Origins, evolution, and disappearance of Neandertals. Emergence of humans like us in both anatomy and behavior. Interpretation of the fossil and archaeological records of Europe and Africa. Genetics of living and fossil humans. Offered in alternate years. GE credit: SciEng | SE.—Weaver

#### **170. Archeological Theory and Method (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 recommended. Introduction to history and development of archeological theory and method, with particular emphasis on the basic dependence of the latter on the former. Stress is on historical development of archaeology in the New World. GE credit: SocSci, Div, Wrt | SS, WE.—W. (W.) Darwent

#### **172. New World Prehistory: The First Arrivals (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 recommended. Survey of data relating to the peopling of the New World. Cultural adaptation and development of early inhabitants of North and South America. Offered in alternate years. GE credit: SocSci, Div, Wrt | SS, WC, WE.—Darwent

#### **173. New World Prehistory: Archaic Adaptations (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 recommended; consent of instructor. Introduction to and survey of prehistoric hunting and gathering adaptations across North America with particular emphasis on the East, Southeast, Midwest, Plains, Southwest, and Northwest. Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WE.

#### **174. European Prehistory (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 recommended. Survey of the prehistory of Europe from its earliest human inhabitants, to the Neandertals and first modern humans, and through early agricultural and complex societies. Analysis and interpretation of the European archaeological record for understanding human dispersals into Europe. Offered in alternate years. GE credit: SocSci | SS, WC, WE.—Steele

#### **175. Andean Prehistory: Archaeology of the Incas and their Ancestors (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 recommended. Prehistory of the Andean region, especially Peru, from the earliest hunting and gathering societies through the Inca. Focus on the use of archaeological data to reconstruct ancient human adaptations to the varied Andean environments. Offered in alternate years. GE credit: SocSci | SS, WC, WE.—Eerkens

#### **176. Prehistory of California and the Great Basin (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 recommended; consent of instructor. Description and analysis of the prehistoric peoples of California and the Great Basin from earliest times

to European contact. Offered in alternate years. GE credit: SocSci, Div, Wrt | ACGH, DD, SS, WE.—Eerkens

#### **177. African Prehistory (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 recommended. Survey of prehistory of Africa from early human ancestors, through modern human origins, and into early agricultural and complex societies and the Bantu expansion. Analysis and interpretation of the African archaeological record, incorporating human paleontology and genetics. Offered in alternate years. GE credit: SocSci | SS, WC, WE.—Steele

#### **178. Hunter-Gatherers (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 recommended. Study and interpretation of the ancient and modern lifeway in which peoples support themselves with primitive technologies and without benefit of domesticated plants and animals. Offered in alternate years. GE credit: SocSci, Div, Wrt | SS, WC, WE.—Bettinger

#### **179. Asian Prehistory (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 recommended. Survey of the prehistory of Asia from the earliest human occupations to the rise of complex societies. Special focus on fossil and archaeological records. Offered in alternate years. GE credit: SocSci—Zwyns

#### **180. Zooarcheology (4)**

Lecture—2 hours; discussion/laboratory—3 hours. Prerequisite: course 1 or course 3 recommended. Restricted to junior or senior standing. Theories and methods for studying animal skeletal remains from archaeological sites. Identification and quantification of zooarchaeological material, cultural and natural processes affecting animal bones pre- and postburial, and use of faunal remains for determining past human diets and past environments. Offered in alternate years. GE credit: SciEng | SE.—W. (W.) Darwent, Steele

#### **181. Field Course in Archeological Method (9)**

Lecture—6 hours; daily field investigation. Prerequisite: course 3. On-site course in archeological methods and techniques held at a field location in the western United States, generally California or Nevada. Introduces basic methods of archeological survey, mapping, and excavation. GE credit: SciEng | SE.—Su. (Su.)

#### **182. Archaeometry (4)**

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 3 recommended. Scientific techniques used to study the chemical and physical properties of archaeological materials. Types of anthropological questions that can be addressed with different methods. Preparation and analysis of archaeological materials. Offered in alternate years. GE credit: SciEng | QL, SE, VL, WE.—Eerkens

#### **183. Laboratory in Archeological Analysis (4)**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 3 recommended; consent of instructor. Limited enrollment. Museum preparation, advanced field investigation, and guidance in preparation of museum material for publication. May be repeated for credit with consent of instructor. Offered irregularly. GE credit: SciEng, Wrt | OL, QL, SE, WE.

#### **184. Prehistoric Technology: The Material Aspects of Prehistoric Adaptation (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 recommended. Examination of the role of lithic, ceramic, textile and wooden implements as elements in prehistoric survival and development. Emphasis is descriptive, but the significance of material resources as factors in prehistoric adaptation, settlement patterns, and culture change are discussed. Offered in alternate years. GE credit: SocSci | SS, WE.—Eerkens

#### **185. Lithic Analysis (4)**

Lecture/laboratory—4 hours. Prerequisite: course 3 recommended. Basic concepts of lithic analysis. General introduction on the place of stone tool tech-

nology in the archeological record. Physics, terminology and methodological concepts behind the study of stone tools. Review of the development of stone tool technology from its emergence. Offered in alternate years. GE credit: SocSci | SS. —Zwyns

#### **186A. Museum Studies: Analysis of Native American Basketry (4)**

Lecture/laboratory—3 hours; discussion/laboratory—1 hour. Class size limited to 25 students. Study of ethnographic and prehistoric basketry from North America, especially California and Oregon, in a multidisciplinary anthropological context. Techniques for basketry attribution and textile analysis. GE credit: ArtHum or SocSci | ACGH, AH or SS, DD, OL, VL, WE. —F. (F.) Bettinger

#### **191. Topics in Anthropology (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: junior or senior standing in anthropology. Intensive treatment of a special anthropological topic or problem. May be repeated one time for credit when topic differs.

#### **192. Internship in Anthropology (1-12)**

Internship—3-36 hours. Prerequisite: Upper division standing; consent of instructor. Work experience off and on campus in all subject areas offered in the Department of Anthropology under the supervision of a member of the faculty. Limited to Anthropology majors. May be repeated for a total of 12 units including 192 courses taken in other departments. (P/NP grading only.)

#### **194H. Special Study for Honors Students (1-5)**

Prerequisite: open only to majors of senior standing who qualify for honors program. Independent study of an anthropological problem involving the writing of an honors thesis. May be repeated for a total of 12 units. (P/NP grading only.) GE credit: WC.

#### **197T. Tutoring in Anthropology (1-5)**

Tutorial—1.5 hours. Prerequisite: upper division standing with major in Anthropology and consent of Department Chairperson. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit. (P/NP grading only.)

#### **198. Directed Group Study (1-5)**

(P/NP grading only.)

#### **199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.)

#### **Graduate**

#### **200. History of Anthropology (4)**

Lecture/discussion—2 hours; term paper. Historical development of socio-cultural theory within anthropology, from mid-19th to mid-20th Centuries. Focus on original theory texts in context of historical developments in the field as a whole. Offered in alternate years.

#### **201. Critical Readings in Ethnography (4)**

Seminar—3 hours; term paper. Prerequisite: graduate student in Anthropology or consent of instructor. Critical readings of selected ethnographies that examine a wide range of important topics and analytical issues in social and cultural anthropology. Emphasis on how and why ethnographic writing has changed over time and its relationship with contemporary theoretical explorations. —F. (F.) Zhang

#### **202. History and Theory of Biological Anthropology (4)**

Seminar—3 hours; term paper. History of thought in biological anthropology and analysis of major theoretical problems in the field. Suggested for all first-year graduate students lacking intensive preparation in biological anthropology. —Weaver

#### **203. History and Theory of Archaeology (4)**

Seminar—3 hours; term paper. Generally restricted to graduate students; outstanding undergraduates with extensive training in archaeology with consent of instructor. History of archaeology and archaeological theory and analysis of archaeological research methodology. —F. (F.) Bettinger

#### **204. Contemporary Issues in Anthropological Theory (4)**

Seminar—3 hours; term paper. Prerequisite: course 2, 137 or consent of instructor. Advanced consideration of fundamental issues in anthropological theory. Emphasis on critical examination of major contemporary debates between proponents of competing theories.

#### **205. History and Theory in Anthropological Linguistics (4)**

Seminar—3 hours; term paper. History of thought in anthropological linguistics. Consideration of the historical development of fundamental ideas in anthropological linguistics, of major theoretical issues, and of research methodology.

#### **206. Research Design and Method in Social Anthropology (5)**

Seminar—4 hours. Prerequisite: consent of instructor. Limited enrollment. Formulation of research problems and preparation of research proposals; relationships between theory and method, funding, pre-fieldwork preparations, entering the community, field research techniques, and problems of ethics; intensive work on proposal writing. May be repeated one time for credit. —S. (S.)

#### **207. Ethnographic Writing (4)**

Seminar—3 hours; term paper. Prerequisite: courses 137, 201, or the equivalent. Relationship between conducting participant observation of others and writing it up, emphasizing the processual rift between the reality of fieldwork and its written representation. Study of various literary genres and textual strategies used in cultural anthropology. May be repeated for credit.

#### **210. Aspects of Culture Structure (4)**

Seminar—3 hours; term paper. Analysis of various phases of culture, such as religion, economics, law, and folklore. May be repeated for credit when topic differs. —F, W, S. (F, W, S.)

#### **211. Advanced Topics in Cultural Ecology (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: Environmental Science and Policy/Anthropology 133, graduate standing in Anthropology or Ecology. Topics of current analytical and methodological importance in cultural ecology. Examination of general issues in cultural ecology through study of human response to and influence on climate. (Same course as Ecology 211.)

#### **212. Political Ecology (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Interdisciplinary seminar evaluating contributions from ecological anthropology, political economy, cultural constructivism, postmodernism, and feminism towards development of theories of political ecology. Historical relationships between local/global power structures, environmental degradation, and resistance movements. Case studies of desertification, deforestation, mining, conservation, development.

#### **216. Problems in Archeological Method (4)**

Seminar—3 hours; term paper. Techniques for analyzing archeological data; application to various prehistoric cultures. May be repeated for credit with consent of instructor. —Darwent, Steele

#### **217. Quantitative Modeling in Archaeology (4)**

Lecture/discussion—3 hours; term paper. Examination of the nature of archaeological data with a focus on the quantitative and statistical techniques available to model, analyze, display, and make sense of such data. Offered irregularly. —Eerkens

#### **218. Topics in New World Prehistory (4)**

Seminar—3 hours; term paper. Advanced study on current problems in New World Prehistory and archaeology. May be repeated for credit only if material is unique for that student and with consent of instructor. May be repeated for credit. Offered irregularly. —Darwent, Eerkens

#### **219. Topics in Old World Prehistory (4)**

Seminar—3 hours; term paper. Advanced study on current problems in Old World prehistory and archaeology. May be repeated for credit only if material is unique for that student and with consent of instructor. May be repeated for credit. Offered irregularly. —Steele, Zwyns

#### **220. Field Course in Linguistics (4)**

Seminar—2 hours; laboratory—2 hours. Prerequisite: courses 110, 111. Techniques of eliciting, recording, and analyzing; work with a native speaker.

#### **221. Rural Transformation in Postcolonial Societies (4)**

Seminar—3 hours; term paper. Prerequisite: courses 223, 265, or consent of instructor. Problems of rural transformation arising out of political and economic interaction between national elites and rural regional and local populations under varying conditions of induced change in postcolonial societies. Attention will be given to the implications of this interaction for rapid economic growth. May be repeated for credit.

#### **222. Cities and Citizenship (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing; consent of instructor. Explores the nature of modern cities, urban socioeconomic life, and urban culture and politics from an anthropological perspective. —F. (F.) Zhang

#### **223. Economic Anthropology (4)**

Seminar—3 hours; term paper. Prerequisite: course 122 or consent of instructor. Selected current methodological and theoretical problems in the analysis of nonindustrial economic systems.

#### **224. Problems in Comparative Religion (4)**

Seminar—3 hours; term paper. Advanced study of current problems in the anthropological study of religion.

#### **225. State and Nation in the Modern World (4)**

Seminar—3 hours; term paper. A presentation of current anthropological theories of the origins and nature of the modern nation-state in both the First and Third Worlds, with special reference to state ideology (nationalism) and forms of control.

#### **226. Consciousness and Resistance (4)**

Seminar—3 hours; term paper. Prerequisite: completion of first-year graduate work or consent of instructor. Consideration of approaches to the study of social inequality, and responses of subordinated groups. Emphasis on situating approaches to contemporary social theory, concrete research problems, and political strategies. Topics: formation of consciousness and identity; collective action, accommodation to frontal resistance.

#### **228. Culture and Power (4)**

Seminar—3 hours; extensive writing. Prerequisite: graduate standing or consent of instructor. Exploration of one of the core paradigms within contemporary anthropological inquiry, "culture and power." Focus on how distinct theoretical perspectives—Marxism, post-Marxism, structuralism, post-structuralism, and feminism—have examined the mutually constitutive nature of culture and power. —W. (W.) Sawyer

#### **229. Gender, Identity, and Self (4)**

Seminar—3 hours; term paper. Intersections of gender, identity, and selfhood cross-culturally and historically. How the self is feminized and masculinized, and interfaces with sexual, race, class, work, national, minority, and majority identities under different historical, cultural, and social structural conditions. May be repeated for credit when topic differs. —W. (W.) Joseph

#### **230. Family Systems and Reproduction: Theory and Comparisons (4)**

Lecture—1.5 hours; seminar—1.5 hours; term paper. Prerequisite: graduate standing in one of the social sciences including History. Comparative examination of family systems in historical context and of reproductive behaviors and strategizing. A major theme is how family-system norms specify the

relative desirability of differently configured offspring sets. Cases are drawn from Western Europe and South and East Asia.

### **232. Political Movements (4)**

Seminar—3 hours; term paper. Prerequisite: completion of first-year graduate work recommended. An interdisciplinary approach to political movements of protest, reform, and revolution emphasizing historical comparison and evaluation of major theoretical approaches including world systems, resource mobilization, state and culture, rational choice, moral economy, social class and gender.

### **239. Problems in African Society and Culture (4)**

Seminar—3 hours; term paper. Diachronic analyses of traditional institutions in sub-Saharan Africa.

### **241. Topics in North American Ethnology (4)**

Seminar—3 hours; term paper. Advanced study on current problems in North American ethnography and culture history. May be repeated for credit with consent of instructor.

### **245. Ethnology of Northern and Central Asia (4)**

Seminar—3 hours; term paper. Prerequisite: a reading knowledge of German, Russian, Chinese, or Japanese. Lectures on the culture aboriginally found north of the Caucasus-Korea line. Supervised study of the primary and secondary sources. Work with informants when available.

### **246. Ethnology of Europe (4)**

Seminar—3 hours; term paper. Prerequisite: reading knowledge of a European language other than English. Supervised study of the primary and secondary sources dealing with the ethnography and ethnology of the peoples of Europe. Emphasis upon folk, peasant, and minority groups.

### **248. Topics in Chinese Culture and Society (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing in the social sciences, history, or the humanities. Selected topics in the anthropology of Chinese society. Focus on one or more of the following topics: state-society dynamics, family and gender, city formation and urban life, social movement, labor politics, and religion and ideology in Chinese society. May be repeated for credit when topic differs.

### **250. Behavioral Ecology of Primates (4)**

Seminar—3 hours; term paper. Prerequisite: course 154A (may be taken concurrently) or the equivalent, graduate standing. Concepts, issues, and hypotheses in primate behavioral ecology, with emphasis on the social and ecological determinants and consequences of variation in social organization for individuals. Offered in alternate years.—Isbell

### **252. Human Evolution Seminar (4)**

Seminar—3 hours; term paper. Prerequisite: course 152 or the equivalent; consent of instructor. Study of selected topics in human evolutionary studies. Each year course will focus on one or more of the following: molecular evolution, primate evolutionary biology, Tertiary hominoids, Australopithecus, Homo erectus, archaic Homo sapiens, brain evolution. May be repeated for credit.—S. (S.) Weaver, Zwyns

### **253. Seminar in Human Biology (4)**

Seminar—3 hours; term paper. Prerequisite: course 153, 157, or consent of instructor. Study of selected topics in human biology. May be repeated for credit when topics vary. Offered irregularly.—W. (W.) D. G. Smith

### **254. Current Issues in Primate Sociobiology (4)**

Seminar—3 hours; term paper. Prerequisite: course 154B or the equivalent. Analysis of primate behavior, with particular emphasis on preparation for field studies. May be repeated for credit when topic differs.—Crofoot, Isbell

### **256. Primate Conservation Biology (4)**

Seminar—3 hours; term paper. Prerequisite: course 154, graduate standing or upper division undergraduate with consent of instructor. Class size limited

to 10 students. Application of understanding of prime biology to conservation of primates and their habitat. Topics include evolutionary anthropology, behavioral ecology, biogeography, macroecology, population biology, and socio-ecology of primates. May be repeated one time for credit if term paper differs. (S/U grading only.) Offered irregularly.

### **261. Modeling the Evolution of Social Behavior (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: Mathematics 16C or the equivalent or consent of instructor. Tools and topics in modeling the evolution of social behavior in humans and other animals. Game theory, basic population genetics, animal conflict, altruism, reciprocity, signaling, and group selection.

### **262. Evolution and Human Behavior (4)**

Discussion—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Exploration of the links between behavioral ecological theory and human cultural variation, focusing on reproduction, marriage, parental investment and family structure; implications of evolutionary theory for social organization in human communities, historical and contemporary. Offered in alternate years.—Bergerhoff, Mulder

### **263. Human Applications of Foraging Theory (4)**

Discussion—3 hours; laboratory—3 hours. Foraging theory models and their use in ethnographic and archaeological analyses of human behavior, with a focus on hunter-gatherers and resource selection, patch use, population and habitat, central places, sharing, stochastic processes, population dynamics, and conservation behavior. Not open for credit to students who have completed course 258. Offered irregularly.

### **265. Language, Performance, and Power (4)**

Seminar—3 hours; term paper. Restricted to graduate standing or consent of instructor. Exploration of the intersection between linguistic and social theories in the language-state relation and the performance of identity. Ideological sources of language differentiation; nation-building and linguistic difference. Political economic, sociolinguistic, and ethnographic approaches to understanding linguistic inequality. (Same course as Linguistics 265.) Offered in alternate years.—Shibamoto-Smith

### **270. Anthropology Colloquium Seminar (1)**

Seminar—1 hour. Reports and discussions of recent advances in the four subfields of anthropology. To be presented by guest speakers. May be repeated two times for credit. (S/U grading only.)—F, W, S. (F, W, S.)

### **280. Current Anthropology Journal Editorial Workshop (4)**

Workshop—1 hour; independent study—3 hours. Prerequisite: consent of instructor. Students must enroll for all three quarters. Reading and offering workshop critiques of manuscripts submitted for publication, and reading and discussion of other relevant work in anthropology and human ecology. Track and edit published comments and authors' replies that accompany major features. Participation in the development of new sections for the electronic edition of the journal, including a "news and views" section and a debate section. (Same course as Ecology 280.) May be repeated up to 12 units for credit with consent of instructor.

### **291. Advanced Topics in Human Behavioral Ecology (4)**

Discussion—3 hours; term paper. Prerequisite: course 261, 262, or 263, or comparable experience in anthropology or related disciplines and consent of instructor. Topically focused, critical discussion of current and emerging research in the field of human behavioral ecology, giving special attention to theory, concepts, models, and methods for the evolutionary analysis of ethnographic and archaeological evidence. May be repeated one time for credit if topic differs.

### **292. Seminar in Linguistic Anthropology (4)**

Seminar—3 hours; term paper. Selected topics in linguistic anthropology. May be repeated for credit when topic differs.

### **298. Group Study (1-4)**

(S/U grading only.)

### **299. Research (1-12)**

(S/U grading only.)

### **299D. Dissertation Research (1-12)**

(S/U grading only.)

### **Professional**

### **390. Teaching Anthropology (4)**

Seminar—3 hours; practice—1 hour. Prerequisite: graduate standing in Anthropology or closely related discipline. Intellectual and practical elements of college teaching in the field of Anthropology, from curriculum design and the syllabus through grading and course evaluations, including classroom and information technology methods, and problems and rewards of teaching in higher education. Offered in alternate years.

### **396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S.

## **Applied Behavioral Sciences**

**See Community and Regional Development, on page 221.**

## **Applied Biological Systems Technology**

(College of Agricultural and Environmental Sciences)

**Faculty.** See under Department of Engineering: Biological and Agricultural, on page 266.

### **Courses in Applied Biological Systems Technology (ABT)**

#### **Lower Division**

##### **15. Wood Properties and Fabrication (2)**

Lecture/discussion—1 hour; laboratory—3 hours. Study of wood properties and techniques for fabrication with wood. Gain experience working with various woods and woodworking tools for specific applications. (P/NP grading only.) GE credit: OL, QL, SE, VL. —W. (W.) Shafii

##### **16. Metal Properties and Fabrication (2)**

Lecture—1 hour; laboratory—3 hours. Study of metal properties and of techniques for fabricating in metal. Physical principles, design considerations, effects of techniques on quality and appearance, and evaluation procedures. Experience in working with metal. (P/NP grading only.) GE credit: QL, SE, VL. —F. (F.) Shafii

##### **17. Plastic Properties and Fabrication (2)**

Lecture—1 hour; laboratory—3 hours. Study of the properties of plastic materials and the fundamentals of fabrication techniques. Experience in working with common plastics, with applications to biological systems. (P/NP grading only.) GE credit: QL, SE, VL. —S. (S.) Shafii

##### **49. Field Equipment Operation (2)**

Lecture—1 hour; laboratory—3 hours. Operation, adjustment, and troubleshooting of farm tractors and field equipment. Principles of operation, equipment terminology and uses of tilling, cultivating, thinning, and planting equipment. Typical sequences in cropping practices. (P/NP grading only.) GE credit: QL, SE, VL. —S. (S.) Shafii

**52. Field Equipment Welding (2)**

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 16 or consent of instructor. Intermediate welding to include hardfacing and inert gas welding. Class projects on repair and fabrication by welding. Troubleshooting and major repair of field equipment. (P/NP grading only.) GE credit: QL, SE, VL.—W. (W.) Shafii

**58. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) GE credit: SE.

**59. Special Study for Lower Division Students (1-5)**

(P/NP grading only.) GE credit: SE.

**Upper Division****101. Engine Technology (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: upper division standing or consent of instructor. Principles of 2-stroke cycle, 4-stroke cycle gasoline and 4-stroke cycle diesel engine construction and operation. Engine systems, performance, troubleshooting, and overhaul. GE credit: SciEng | QL, SE, VL.—W. (W.) Jenkins, Vougioukas

**110L Experiments in Food Engineering (2)**

Laboratory—6 hours. Prerequisite: Food Science and Technology 110B (may be taken concurrently). Use of temperature sensors; measurement of thermal conductivity and heat transfer in foods; refrigeration, freezing, concentration and dehydration of foods. GE credit: SciEng | QL, SE, VL, WE.—S. (S.) Bornhorst

**121. Animal Housing and Environment Management (2)**

Lecture—2 hours. Prerequisite: Animal Science 1 or 2. Optimal structures and environments for animal growth and comfort; heat and moisture transfer principles; heating, cooling, ventilating principles and equipment; animal housing design; environmental regulations and waste management practices. Offered in alternate years. GE credit: SciEng | SE.—(W.) Zhang

**142. Equipment and Technology for Small Farms (2)**

Lecture—1 hour; laboratory—3 hours. Types and characteristics of agricultural equipment and technologies appropriate for small commercial farming. Adjustment and calibration of equipment. Selection of and budgeting for equipment. (Same course as International Agricultural Development 142.) GE credit: SciEng | QL, SE, VL.—S. (S.) Shafii

**150. Introduction to Geographic Information Systems (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Plant Sciences 21 or equivalent with consent of instructor. Priority given to College of Agricultural and Environmental Science majors. Basic concepts, principles and methods of GIS are presented. Data structures, database design, GIS data creation, GPS, and spatial analysis techniques are emphasized. Lab topics include: online data sources, aerial photography, GPS data input, suitability analysis, cartographic design and graphic communication. Not open for credit to students who have completed Applied Biological Systems Technology 180/Plant Sciences 180 or Applied Biological Systems Technology 181N. (Same course as Landscape Architecture 150.) GE credit: SciEng | SE, VL.—F. (F.) Greco, Upadhyaya

**161. Water Quality Management for Aquaculture (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 1B, Mathematics 16B, Chemistry 2B. Basic principles of water chemistry and water treatment processes as they relate to aquacultural systems. Offered in alternate years. GE credit: SciEng | QL, SE, SL, VL.—W. Hung

**163. Aquaculture Systems Engineering (3)**

Lecture—3 hours. Prerequisite: course 161. Design of aquacultural systems: design methodology, principles of fluid mechanics, site selection and facility

planning, management operations, computer modeling. Offered in alternate years. GE credit: SciEng | OL, QL, SE, SL, VL, WE.—S. Hung

**165. Irrigation Practices for an Urban Environment (2)**

Lecture—2 hours. Prerequisite: Physics 1A or 5A. Basic design, installation, and operation principles of irrigation systems for turf and landscape: golf courses, parks, highways, public buildings, etc. Emphasis on hardware association with sprinkler and drip/trickle systems. GE credit: SciEng | QL, SE, VL.—W. (W.) Grismer

**181N. Concepts and Methods in Geographic Information Systems (4)**

Lecture/laboratory—8 hours. Prerequisite: course 180 or Agricultural Management and Rangeland Resources 180 or Landscape Architecture 50 or consent of instructor. Data representation and analysis in geographic information systems (GIS). Creation of spatial data sets from analog and digital sources such as aerial photography and maps; data structures, data management, database design, georeferencing, georectification, surface models, analysis, and spatial data visualization. Offered in alternate years. GE credit: SciEng | SE, SL, VL.—W. Hijmans

**182. Environmental Analysis using GIS (4)**

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 180 or equivalent GIS experience and skills; general biology and/or ecology courses recommended. Ecosystem and landscape modeling with emphasis on hydrology and solute transport. Spatial analysis of environmental risk analysis including ecological risk assessment, natural resource management. Spatial database structures, scripting, data models, and error analysis in GIS. (Same course as Hydrologic Science 182.) Offered in alternate years. GE credit: SciEng | QL, SE, SL, VL.—S. Hijmans, Zhang

**190C. Research Conference for Advanced Undergraduates (1)**

Discussion—1 hour. Prerequisite: consent of instructor. Research conferences for specialized study in applied biological systems technology. May be repeated for credit. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

**192. Internship in Applied Biological Systems Technology (1-5)**

Internship—3-15 hours. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised internship in applied biological systems technology. May be repeated for credit. (P/NP grading only.) GE credit: SE.

**197T. Tutoring in Applied Biological Systems Technology (1-5)**

Tutorial. Prerequisite: consent of instructor; upper division standing. Tutoring individual students, leading small voluntary discussion groups, or assisting the instructor in laboratories affiliated with one of the department's regular courses. May be repeated for credit if topic differs. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

**198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) GE credit: SE.

**199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.) GE credit: SE.

**Graduate****233. Pest Control Practices (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: graduate standing or consent of instructor. Practical and theoretical considerations of pest control systems and techniques. Design, selection, and use of mechanical systems for field, orchard, greenhouse, and vector control use. Biological, legal, and environmental considerations in pest control and pesticide application.—W. (W.) Giles

**289A. Selected Topic in Applied Biological Systems Technology: Agricultural and Natural Resources (1-5)**

Prerequisite: consent of instructor. Special topic. May be repeated for credit. Offered irregularly.—F, W, S. (F, W, S.)

**289B. Selected Topics in Applied Biological Systems Technology: Biotechnology (1-5)**

Prerequisite: consent of instructor. Special topic. May be repeated for credit. Offered irregularly.—F, W, S. (F, W, S.)

**289C. Selected Topics in Applied Biological Systems Technology: Food Technology (1-5)**

Prerequisite: consent of instructor. Special topic. May be repeated for credit. Offered irregularly.—F, W, S. (F, W, S.)

**290C. Graduate Research Conference (1)**

Discussion—1 hour. Prerequisite: consent of instructor. Research problems, progress, and techniques in applied biological systems technology. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**298. Group Study (1-5)****299. Research (1-12)**

(S/U grading only.)

**Professional****317. Teaching Agricultural Mechanics (2)**

Lecture—1 hour; laboratory—3 hours. Prerequisite: a course in physics; 6 units related to agricultural mechanics; enrolled in Agricultural Education Teacher Credential Program. Preparation of the teacher to plan, organize, and conduct an agricultural mechanics program in secondary schools. Development of and presentation of lesson plans and teaching aids. Review of subject matter in metal fabrication, power and machinery and agricultural structures areas.—F. (F.) Shafii

## Applied Computing and Information Systems

(College of Agricultural and Environmental Sciences)

This minor is for students interested in applying modern computer technology to management problems in agriculture, resource management, and other areas. Course work provides knowledge of the use of information technology and the methodology of applied quantitative and systems analysis. The minor is offered by the Department of Plant Sciences.

**Minor Program Requirements:**

UNITS

**Applied Computing and Information Systems .....**

18

Two or three of the following courses: Plant Sciences 120, 121, Animal Science 128, Engineering: Computer Science 167. (The third course may be taken in substitution for a course from either of the elective groups.)

Remainder of the units to be made up of courses in one or both of the following groups .....

6-12

*Computer Applications, Computer Assisted Analysis in Data Manipulation: Agricultural and Resource Economics 106, 155, Plant Sciences 180, Applied Biological Systems Technology 180, 181, 182, Community and Regional Development 160, Economics 102,*

*Engineering: Computer Science 124, Hydrologic Science 182, International Agricultural Development 170, Statistics 141 Communication and Business Organization:*

*Agricultural and Resource Economics 112, Community and Regional Development 168, Communication 103, 130, 134, 135, 136, International Agricultural Development 111*

**Minor Adviser.** T. R. Famula (*Animal Science*)

**Advising Center** is located in 1220 Plant and Environmental Sciences 530-752-1715.

## Applied Mathematics (A Graduate Group)

**Group Office.** 1130 Mathematical Sciences Bldg.  
530-752-8130  
[studentservices@math.ucdavis.edu](mailto:studentservices@math.ucdavis.edu);  
<http://math.ucdavis.edu/grad/ggam>

**Faculty.** The Group includes approximately 90 faculty members, of whom about one-third are in the Department of Mathematics. Membership comprises chemists, biologists, physicists, geologists, statisticians, computer scientists, and engineers. Research interests include biology, atmospheric sciences, mechanics, solid and fluid dynamics, optimization and control, theoretical chemistry, computer and engineering sciences, mathematical physics, signal and image processing, harmonic analysis, numerical analysis and nonlinear partial differential equations. A complete list of faculty and their research areas are available at <http://math.ucdavis.edu/grad/ggam/faculty>.

**Graduate Study.** Students prepare for careers where mathematics is applied to problems in the physical and life sciences, engineering, and management. The degree requirements consist of rigorous training in applied mathematics, including course work and a research dissertation under the direction of a member of the Graduate Group in Applied Mathematics. The M.S. degree provides preparation for further study in applied mathematics or an application area, or for a career in industry or public service. The Ph.D. degree provides preparation for a career in research and/or teaching, or in industrial or national research laboratories. For further information, please contact [studentservices@math.ucdavis.edu](mailto:studentservices@math.ucdavis.edu) or 530-752-8130.

New applicants are admitted to the fall quarter only.

**Preparation.** The program admits qualified students with a bachelor's degree in mathematics, physics, chemistry, engineering, economics, the life sciences and related fields. General and advanced mathematics GRE scores are required, and applicants should display evidence of strong quantitative skills. Undergraduate courses should include calculus (including vector calculus), linear algebra, and ordinary differential equations. Advanced calculus (introduction to real analysis) is strongly recommended. Additional background in probability, partial differential equations, and/or numerical analysis is a plus. The ability to program in a high-level computer programming language (e.g., C, Fortran, MATLAB, Python, R, etc.) is assumed.

**Graduate Advisers.** Contact the Student Services Office at 530-752-8130 or by email at [studentservices@math.ucdavis.edu](mailto:studentservices@math.ucdavis.edu).

**Courses.** For a list of the courses in applied mathematics and mathematics, see [Mathematics, on page 419](#).

## Applied Physics

See [Physics, on page 503](#).

## Aquaculture

See [Animal Biology, on page 160](#);  
[Animal Science, on page 162](#);  
[Applied Biological Systems Technology, on page 174](#); and  
[Wildlife, Fish, and Conservation Biology, on page 587](#).

## Arabic

See [Classics, on page 211](#).

## Art History

(College of Letters and Science)

**Department Office.** 101 Art Building  
530-752-0105; <http://arthistory.ucdavis.edu>

### Faculty

Katharine Burnett, Ph.D., Associate Professor  
Taliyah Grigor, Professor  
Lynn Roller, Ph.D., Professor  
Diana Strazdes, Ph.D., Associate Professor  
Hegnar Watenpaugh, Ph.D., Associate Professor

### Emeriti Faculty

Robert J. Grigg, Ph.D., Professor Emeritus  
Seymour Howard, Ph.D., Professor Emeritus  
Jeffrey Ruda, Ph.D., Professor Emeritus  
Dianne Sachko Macleod, Ph.D., Professor Emerita

### The Major Program

Art History studies the changing visual expression of values, beliefs and experiences across diverse cultures and over time. It provides training in historical, social and aesthetic understanding, critical thinking, scholarly research, and lucid, thoughtful analysis and writing. More than any other discipline art history sharpens its students' visual acuity and deepens their visual literacy. In so doing, it prepares them to face the increasingly complex visual world we find ourselves in today.

**The Program.** The major begins with a series of courses that surveys major landmarks in the history of visual culture, art and architecture in Asia, Europe, and the United States. More advanced lecture courses and proseminars focus on particularly important periods and issues. Students are encouraged to personalize their training with internships, independent study, and focused upper-division study. Top students considering graduate study are encouraged to engage in more advance study in the Honors program.

**Career Options.** A major in Art History develops critical thinking and the integration of research, interpretation and understanding. It provides an excellent liberal arts basis for professions as far ranging as advertising, law, medicine, politics and business. The major prepares students for advanced study in Art History, Architecture, Museum Studies and Cultural Studies. It also serves as the foundation for careers in teaching, arts, administration, museums, galleries, historic preservation, art libraries, publishing, journalism, advertising, art conservation, and art investment. As the world becomes increasingly flooded with images, the critical visual literacy gained through the study of art history becomes more important for a wide variety of careers.

### A.B. Major Requirements:

**Preparatory Subject Matter** ..... 20 UNITS

Any four of the following courses: Art History 1A, 1B, 1C, 1D, 1DY, 1E, 5, and 25 ..... 16  
Any lower division Art Studio course except Art 10 or 30 ..... 4

**Depth Subject Matter** ..... 40

Four courses, one each in four of the following six areas. Two courses must be from areas a, b, c, and two courses must be from areas d, e, f ..... 16  
(a) Ancient Mediterranean Art: Art History 172A, 172B, 173, 175  
(b) East Asian Art: Art History 163A, 163B, 163C, 163D, 164  
(c) Islamic Art: Art History 120A, 155, 156  
(d) European Art before 1700: Art History 178B, 178C, 179B  
(e) Western Art 1700-1900: Art History 110, 130, 168, 182, 183A, 183B, 188A, 188B, 188C  
(f) Art after 1900: 148, 163D, 183C, 184, 185, 186, 189

Two additional Art History courses which may include 401, 402; Undergraduate Seminar, Art History 190A-H strongly recommended ..... 8

One lower division course may be substituted for upper-division study in any of these areas. Other appropriate substitutions may be made for the course options listed above with the prior consent of the major adviser.

**Total Units for the Major** ..... 60

**Emphasis in Architectural History** UNITS

**Art History** ..... 60

Emphasis in Architectural History follows the same requirements as for the Art History major above, applying at least six of the following courses to their respective required areas or as electives: Art History 25, 110, 120A, 155, 163A, 168, 172A, 172B, 173, 175, 176A, 176B, 176C, 178B, 178C, 184, 188A, 188B.

Fulfilling the undergraduate seminar requirement (Art History 190A-H) through an architectural topic is highly recommended.

### Minor Program Requirements:

UNITS

**Art History** ..... 20

Three courses chosen from three of the following six areas with at least one course in area a, b, or c, and one course in area d, e, or f ..... 12

(a) Ancient Mediterranean Art: Art History 172A, 172B, 173, 175

(b) East Asian Art: Art History 163A, 163B, 163C, 163D, 164

(c) Islamic Art: Art History 120A, 155, 156

(d) European Art before 1700: Art History 178B, 178C, 179B

(e) Western Art 1700-1900: Art History 110, 130, 168, 182, 183A, 183B, 188A, 188B, 188C

(f) Art after 1900: 148, 163D, 183C, 184, 185, 186, 189

Two additional Art History courses which may include 401, 402; Undergraduate Seminar, Art History 190A-H strongly recommended ..... 8

One lower division course may be substituted for upper-division study in any of these areas. Other appropriate substitutions may be made for the course options listed above with the prior consent of the major adviser.

**Honors Program.** The Honors Program is encouraged for Art History majors who are considering attending graduate school. To be eligible for the program, a student must have a grade point average of 3.700 in the major or consent of the major adviser. In addition to meeting the standard major requirements, the honors student completes one undergraduate seminar (course 100 or 190A-L), and writes an honors thesis (course 194H) after completing Art History 100 or equivalent, and after satisfactorily preparing a preliminary thesis draft through a preparatory special study (Art History 199), supervised by the prospective thesis adviser. Students participating in this Program are candidates for Departmental recommendation for graduation with High or Highest Honors. See the Academic Information chapter, Letters and Science honors section, of this catalog and consult the department website for more information.

**Teaching Credential Subject Representative.** Department Chairperson; see the Teacher Education program.

**Graduate Study.** The Program in Art History offers studies leading to the Master of Arts degree in History of Art as preparation for further graduate study or professional work. For more information, contact the Graduate Staff Adviser at 530-752-8710, or see <http://arthistory.ucdavis.edu>.

## Courses in Art History (AHI)

### Lower Division

#### 1A. Ancient Mediterranean Art (4)

Lecture—3 hours; discussion—1 hour. Introduction to the art and architecture of the ancient Mediterranean world, including Mesopotamia, Egypt, Greece, and Rome. GE credit: ArtHum | AH, VL, WC.—F. (F.) Roller

#### 1B. Medieval and Renaissance Art (4)

Lecture—3 hours; discussion—1 hour. Christian, Barbarian, Moslem, and Classical traditions in European Art from the fourth through the sixteenth centuries. GE credit: ArtHum | AH, VL, WC.—W. (W.)

#### 1C. Baroque to Modern Art (4)

Lecture—3 hours; discussion—1 hour. Introduction to visual analysis through study of western art 1600-present, examining major artists and movements from Europe to North America. Study of the relationship of art and artists to political, religious, social change, and to changes in ideology, patronage, audience. May be repeated for credit. GE credit: ArtHum, Div | AH, VL, WC.—S. (S.) Strazdes

#### 1D. Arts of Asia (4)

Lecture—3 hours; discussion—1 hour. Introduction to major forms and trends in the arts, architecture, and material culture of Asia from the Neolithic to the contemporary emphasizing the visual manifestation of secular and religious ideas and ideals. Not open for credit to students who have completed course 1DV. GE credit: ArtHum, Div | AH, VL, WC.—Burnett

#### 1DY. Arts of Asia (5)

Web virtual lecture—2.5 hours; discussion—1 hour; lecture/discussion—1.5 hours. Introduction to major forms and trends in the arts and material culture of Asia from the Neolithic to the contemporary, emphasizing the visual manifestation of secular and religious ideas and ideals. Not open for credit to students who have completed course 1D. GE credit: ArtHum, Div | AH, VL, WC, WE.—Burnett

#### 1E. Islamic Art and Architecture (4)

Lecture—3 hours; discussion—1 hour. Introduction to the art and architecture of the Islamic world including the Middle East, Africa, Europe, and South Asia, from the 7th century CE to the 20th. Offered in alternate years. GE credit: ArtHum, Div | AH, VL, WC.—Watenpaugh

#### 5. Understanding Visual Culture (4)

Lecture/discussion—3 hours; discussion—1 hour. Development of visual literacy for an increasingly visual world; critical analyses focusing on the widest variety of visual imagery: the fine arts across media and eras of world culture, television, film, and advertising. Intended for a diverse spectrum of audiences. GE credit: ArtHum | AH, VL, WC.

#### 25. Understanding Architecture (4)

Lecture—3 hours; discussion—1 hour. Development of architecture and urban design; how form, space, order are conceived and used across eras and cultures. Examines the function and organization of space, technological problems of construction, visual qualities of architecture, and social issues connected to architecture. GE credit: ArtHum | AH, DD, VL, WC.—Watenpaugh

#### 98. Directed Group Study (1-5)

Prerequisite: consent of instructor. Restricted to lower division students. (P/NP grading only.)

#### 99. Special Study for Undergraduates (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division

#### 100. Methods of Art History (4)

Extensive writing or discussion—3 hours; term paper. Prerequisite: prior completion of two upper-division Art History courses recommended. Methods of art historical research and analysis, and general issues in critical thought. Writing skills appropriate to a range of art-historical exposition. Offered irregularly. GE credit: ArtHum, Wrt | AH, VL.—Ruda

#### 110. Cultural History of Museums (4)

Lecture/discussion—3 hours; term paper. Evolution of museums in the western world from the "cabinet of curiosities" of sixteenth-century Europe to the modern "art center." The changing motives behind collecting, exhibiting, and interpretation of objects. Attention to museums' historical legacies and continuing philosophical dilemmas. Offered in alternate years. GE credit: ArtHum, Wrt | AH, VL, WE.—Strazdes

#### 120A. Art, Architecture, and Human Rights (4)

Lecture/discussion—4 hours. Study of human rights as they relate to art, architecture, and cultural heritage. Examines museums, art collections, and cultural-heritage management, their relation to the cultural prerogatives of communities and indigenous groups, and protection of cultural heritage during war and conflict. (Same course as Human Rights 120A.) Offered in alternate years. GE credit: ArtHum or SocSci | AH or SS, DD, VL WC, WE.—Watenpaugh

#### 130. Landscape, Nature, and Art (4)

Lecture—3 hours; term paper. Interpretation of the natural world in the western world 1600-1900, with perspectives on the present; landscape painting, ideology of picturesque and sublime, landscape art and travel, reshaping the land as art; dialogues between art and science; nature as national identity. GE credit: ArtHum | AH, VL, WC, WE.

#### 148. Theory and Criticism: Painting & Sculpture (4)

Lecture—3 hours; term paper. Prerequisite: Art Studio 5 or 7 recommended. Study of forms and symbols in historic and contemporary masterpieces. (Same course as Art Studio 148.) Offered in alternate years. GE credit: ArtHum, Wrt | AH, VL, WE.—Pardee

#### 150. Arts of Subsaharan Africa (4)

Lecture/discussion—3 hours; term paper. Traditional arts and crafts of subsaharan Africa from prehistoric times to the present; the relationships among art, nature, cycles of life, and religion; art as expression of power; sculpture and culture in West and Central Africa; Colonialism and collecting. Offered irregularly. GE credit: ArtHum, Div | AH, VL, WC.

#### 151. Arts of the Indians of the Americas (4)

Lecture/discussion—3 hours; term paper. Development of art in North America, emphasizing ancient Mexico. South American relationships and parallels. Recent and contemporary Indian arts and crafts from Alaska to Chile. Offered irregularly. GE credit: ArtHum, Div | AH, VL, WE.

#### 152. Arts of Oceania and Prehistoric Europe (4)

Lecture—3 hours; term paper. Traditional arts of aboriginal Australia, Melanesia, Polynesia, and Micronesia, as seen in their cultural contexts. Prehistoric art of Europe and the Near East. GE credit: ArtHum, Div | AH, VL, WC.

#### 154. The Hindu Temple (4)

Lecture—3 hours; term paper. Comparative history of architecture and symbolism of the Hindu Temple in India, Southeast Asia and the United States. Attention to the temple as expression of religious knowledge, political authority, and cultural heritage through the lens of colonialism and postcolonialism. (Same course as Religious Studies 154.) Offered in alternate years. GE credit: ArtHum or SocSci | AH or SS, VL, WC, WE.—Venkatesan

#### 155. The Islamic City (4)

Lecture—3 hours; term paper. Prerequisite: course 1E recommended. Introduction to the urban history of the Islamic world. Includes critical study of the historiography of the Islamic city, development of urban form, institutions and rituals, and analysis of selected themes. GE credit: ArtHum, Div, Wrt | AH, VL.—Watenpaugh

#### 156. Arts of the Islamic Book (4)

Lecture—3 hours; term paper. Prerequisite: prior completion of course 1E recommended. Critical study of the arts of the luxury book in the pre-modern Islamic world. Representation in Islam, the relationship of word and image, the discipline of calligraphy, aesthetics and representation in Persianate painting. Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, VL, WC.—Watenpaugh

#### 163A. Chinese Art (4)

Lecture/discussion—4 hours. Thematic and chronological examination of 3000 years of Chinese art and culture from Neolithic through Tang Dynasty (10th c. CE). Study of ceremonial and secular objects manifesting folk beliefs and belief systems of ancestor worship, Buddhism, Daoism, and Confucianism. Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.—Burnett

#### 163B. Chinese Painting (4)

Lecture/discussion—4 hours. Thematic and chronological examination of Chinese painting and culture from the Tang Dynasty (7th c. CE) through the early 20th century. Issues considered include political art (made to support or protest regimes), art and the market, art and individual expression. Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.—Burnett

#### 163C. Early Modern Chinese Painting (4)

Lecture/discussion—4 hours. Topics in Chinese Art History, 13th-19th century. Study of issues pertaining to self and society; gender and gendering; religion and philosophy; political engagement and protest; economy and the market; the effects created by periods of transition on visual expression. Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.—Burnett

#### 163D. Art from China 1900 to the Present (4)

Lecture/discussion—4 hours. Prerequisite: course 163B or consent of instructor. Forms of modern and avant-garde expression from China's industrialization to the 21st century. Interactions of art and politics, individual and state, art for the free market versus art for the state, expressions of modernity; China on the world stage. Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.—Burnett

#### 164. The Arts of Japan (4)

Lecture/discussion—3 hours; term paper. Japan's painting, architecture, decorative arts, and print heritage, ancient times to the 20th century in literary, political, intellectual, and spiritual contexts; impact of Japanese art on the West and the West's transformative impact upon Japan's opening in the 19th century. GE credit: ArtHum, Div, Wrt | AH, VL, WC.

#### 168. Great Cities (4)

Lecture—3 hours; term paper. Transformation in architecture and urban form in Paris, London, and Vienna in the context of varying social, political, and economic systems as well as very different cultural traditions, concentrating on the years 1830-1914. Offered in alternate years. GE credit: ArtHum, Wrt | AH, VL, WE.—Sadler

#### 172A. Early Greek Art and Architecture (4)

Lecture—3 hours; term paper. Examination of the origin and development of the major monuments of Greek art and architecture from the eighth century to the mid-fifth century B.C. (Same course as Classics 172A.) Offered in alternate years. GE credit: ArtHum, Wrt | AH, VL, WE.—Roller

#### 172B. Later Greek Art and Architecture (4)

Lecture—3 hours; term paper. Study of the art and architecture of later Classical and Hellenistic Greece, from the mid-fifth century to the first century

B.C. (Same course as Classics 172B.) Offered in alternate years. GE credit: ArtHum, Wrt | AH, VL, —Roller

### **173. Roman Art and Architecture (4)**

Lecture—3 hours; term paper. Art and architecture of Rome and the Roman Empire, from the founding of Rome through the fourth century C.E. (Same course as Classics 173.) Offered in alternate years. GE credit: ArtHum, Wrt | AH, VL, WE.—Roller

### **175. Architecture and Urbanism in Mediterranean Antiquity (4)**

Lecture—3 hours; extensive writing. Prerequisite: a lower division Classics course (except 30, 31); course 1A recommended. Architecture and urban development in the ancient Near East, Greece, and Rome. Special emphasis on the social structure of the ancient city as expressed in its architecture, and on the interaction between local traditions and the impact of Greco-Roman urbanism. (Same course as Classics 175.) Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.—Roller

### **176A. Art of the Middle Ages: Early Christian and Byzantine Art (4)**

Lecture—3 hours; term paper or gallery studies and review. Painting, sculpture and architecture of the early Christian era and Byzantine Empire: through the later Roman Empire in the West and to the final capture of Constantinople in the East. GE credit: ArtHum, Wrt | AH, VL, WC, WE.

### **176B. Art of the Middle Ages: Early Medieval and Romanesque Art (4)**

Lecture—3 hours; term paper or gallery studies and review. Painting, sculpture and architecture of western Europe in the early medieval era: from the rise of the barbarian kingdoms through the twelfth century. GE credit: ArtHum, Wrt | AH, VL, WC, WE.

### **176C. Art of the Middle Ages: Gothic (4)**

Lecture—3 hours; term paper or gallery studies and review. Painting, sculpture and architecture in northern Europe from the twelfth through the fifteenth centuries. GE credit: ArtHum | AH, VL, WC, WE.

### **177. Northern Renaissance Art (4)**

Lecture/discussion—3 hours; term paper. Artistic culture of Western and Central Europe c. 1350-1600. Topics include the development of “realism” in portraiture and landscape, prints and print culture, urbanism, science and the exotic, anti-religious artworks, religious attacks on art, contacts with Renaissance Italy. Offered irregularly. GE credit: ArtHum | AH, VL, WC, WE.

### **178B. Early Italian Renaissance Art and Architecture (4)**

Lecture—3 hours; term paper. Fifteenth-century artists, with a focus on Florence; Donatello and Masaccio through Botticelli, in their artistic, architectural, and cultural setting; the impact of Humanism and the rebirth of classical learning. GE credit: ArtHum, Wrt | AH, VL, WE.

### **178C. High and Late Italian Renaissance Art and Architecture (4)**

Lecture—3 hours; term paper. High Renaissance and Mannerism in 16th-century Italy: Leonardo, Michelangelo, Raphael, and Titian in their artistic and cultural settings—Florence, Rome, and Venice; the architecture of Bramante, Michelangelo, and Palladio. GE credit: ArtHum, Wrt | AH, VL, WE.

### **179B. Baroque Art (4)**

Lecture—3 hours; term paper. Seventeenth-century painting, sculpture and graphic arts, including such artists as Caravaggio, Rubens, Rembrandt, and Velázquez in their political and social context. GE credit: ArtHum, Wrt | AH, VL, WE.

### **182. British Art and Culture, 1750–1900 (4)**

Lecture—3 hours; term paper. British painting in relation to the position of women in society and the rise of the middle-class art market. Topics include Hogarth and popular culture, Queen Victoria and the female gaze, and Pre-Raphaelite artists and collectors. GE credit: ArtHum, Wrt | AH, VL, WC, WE.

### **183A. Art in the Age of Revolution, 1750–1850 (4)**

Lecture—3 hours; term paper. Prerequisite: prior completion of course 1C recommended. Emergence of modernism in Europe from the late 18th century to the middle of the 19th century. Major artistic events viewed against a revolutionary backdrop of changing attitudes toward identity, race, and gender. GE credit: ArtHum | AH, VL, WE.—Strazdes

### **183B. Impressionism and Post-Impressionism: Manet to 1900 (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1C recommended. Innovations of Impressionists, Post-Impressionists, and Symbolists in relation to social changes. Assessment of role of dealers and critics, myth of the artist-genius, and gender relations in French art and culture of the late 1800s. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.

### **183C. Modernism in France, 1880–1940 (4)**

Lecture—3 hours; term paper. Development of modern art in France, its social context, and its transnational aspects. Post-Impressionism, Fauvism, Cubism, Expressionism, and Surrealism are considered in relation to secessionist movements, the formation of other artistic groups, new forms of patronage, and new audiences. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.

### **184. Twentieth Century Architecture (4)**

Lecture—3 hours; term paper. Prerequisite: prior completion of course 25 recommended. Major movements in architecture of the twentieth century in Europe and America. Formal innovations are examined within the social, political, and economic circumstances in which they emerged. GE credit: ArtHum, Wrt | AH, VL, WE.—Sadler

### **185. Avant-Gardism and its Aftermath, 1917–1960 (4)**

Lecture/discussion—4 hours. Social, cultural, aesthetic, and theoretical development for artists and their audiences in the context of larger issues like the Mexican, Russian and German revolutions, WWI, the Depression, WWII, etc., and a critical-theoretical inquiry into questions of modernism, modernity, and avant-gardism. Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, VL, WC.—Stimson

### **186. Contemporary Art 1960–Present (4)**

Lecture/discussion—4 hours; term paper. Development of new media and aesthetics in the context of such cultural and political phenomena as the New Left, feminism, and globalization; investigation of the critical-theoretical questions of neo avant-gardism, postmodernism, and postmodernity. GE credit: ArtHum, Div, Wrt | ACGH, AH, VL, WE.

### **187. Contemporary Architecture (4)**

Lecture—3 hours; term paper. Prerequisite: prior completion of course 25 and/or course 184 recommended. Introduction to world architecture and urban design since circa 1966. Relation of influential styles, buildings, and architects to postmodern debates and to cultural, economic, technological and environmental change. Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, VL, WE.

### **188A. The American Home (4)**

Lecture/discussion—4 hours; term paper. American domestic architecture and its responsiveness to changes in daily life from Colonial times to the 1960s. Vernacular developments, effects of different socioeconomic conditions, and women's role in shaping the home receive special attention. GE credit: ArtHum, Div, Wrt | ACGH, AH, DD, VL, WE.—Strazdes

### **188B. Architecture of the United States (4)**

Lecture/discussion—3 hours; term paper. Major movements from colonial times to the present. The role of buildings in a changing American society, the interplay of styles with technologies of construction, relationship between American and European developments and evolution of the architectural and planning professions. GE credit: ArtHum, Wrt | ACGH, AH, VL, WE.—Cogdell, Strazdes

### **188C. American Art to 1910 (4)**

Lecture/discussion—4 hours; term paper. Major movements in American art from the 17th-century English speaking colonies to the onset of World War I. Offered in alternate years. GE credit: ArtHum | ACGH, AH, VL, WE.—Strazdes

### **189. Photography in History (4)**

Lecture/discussion—4 hours. Social, cultural, aesthetic and technical developments in the history of photography including patronage and reception, commercial, scientific, political and artistic applications, and a critical-theoretical inquiry into photography's impact on the social category “art” and the history of subjectivity. Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, VL.

### **190A. Undergraduate Seminar in Art History: Mediterranean Antiquity (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated two times for credit when topic differs. GE credit: ArtHum | AH, OL, VL, WE.—Roller

### **190B. Undergraduate Seminar in Art History: Medieval (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated two times for credit when topic differs. GE credit: ArtHum | AH, OL, VL, WE.

### **190C. Undergraduate Seminar in Art History: Renaissance (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated two times for credit when topic differs. GE credit: ArtHum | AH, OL, VL, WE.

### **190D. Undergraduate Seminar in Art History (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated two times for credit when topic differs. GE credit: ArtHum | AH, OL, VL, WE.—Strazdes

### **190E. Undergraduate Seminar in Art History: Gendering of Culture (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated two times for credit when topic differs. GE credit: ArtHum | AH, OL, VL, WE.

### **190F. Undergraduate Seminar in Art History: Chinese (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated two times for credit when topic differs. GE credit: ArtHum | AH, OL, VL, WE.—Burnett

**190G. Undergraduate Seminar in Art History: Japanese (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated two times for credit when topic differs. GE credit: ArtHum | AH, OL, VL, WE.

**190H. Undergraduate Seminar in Art History: Modern-Contemporary (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated two times for credit when topic differs. GE credit: ArtHum | AH, OL, VL, WE.

**190I. Undergraduate Seminar in Art History: 17th-18th Century (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated two times for credit when topic differs. GE credit: ArtHum | AH, OL, VL, WE.

**190J. Undergraduate Seminar in Art History: Islamic (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. May be repeated two times for credit when topic differs. GE credit: ArtHum | AH, OL, VL, WE.—Watenpaugh

**190K. Undergraduate Seminar in Art History: 19th Century (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. GE credit: ArtHum | AH, OL, VL, WE.

**190L. Undergraduate Seminar in Art History: Architecture & Heritage (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: Art History major, minor, or other significant training in Art History recommended. Class size limited to 25 students; for majors, minors, other advanced students. Study of a broad problem or theoretical issue in art, architecture, or material culture. Intensive reading, discussion, research, writing. GE credit: ArtHum | AH, OL, VL, WE.

**192. Internship (2-12)**

Internship—term paper or catalogue. Supervised program of internships at professional art institutions such as museums, galleries, and art archives including collections of slides and photographs. May be repeated one time for credit. (P/NP grading only.)

**194H. Special Study for Honor Students (4)**  
Independent study—12 hours. Prerequisite: course 190 or the equivalent, as determined by the major adviser. Open only to students in the Art History Honors Program. Independent study of an art historical problem culminating in the writing of an honors thesis under the supervision of a faculty guidance committee.

**198. Directed Group Study (1-5)**

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.)

**Graduate****200A. Visual Theory and Interpretive Methods (4)**

Discussion—3 hours; extensive writing. Close study of selected recent developments in interpretive methodology used by art historians and other analysts of visual culture and the place of those developments within art history's history and in the larger field of social, cultural and historical analysis. May be repeated one time for credit. —Roller, Watenpaugh

**200B. Research and Writing Methods in Art History (4)**

Discussion—3 hours; term paper. Restricted to graduate students in art history. Development of the research, writing, and editing skills necessary for producing publishable work. Focus on reference tools used by art historians and the mechanics of scholarship, from question framing and organization of ideas to writing clear, effective prose. —Burnett, Strazdes

**200C. Thesis Writing Colloquium (1)**

Discussion—1.5 hour; autotutorial. Prerequisite: course 200B, taken by all Art History M.A. students in their first year. Restricted to graduate students in Art History. Meeting concurrently with course 200B, the colloquium provides a structured, supportive environment for second-year Art History graduate students drafting masters' theses. Offers a forum for technical discussions, discussion of writing/editing procedures, and peer review of writing in progress. (S/U grading only.) —Burnett, Strazdes

**210. Museums, Art Exhibitions and Culture (4)**

Seminar—3 hours; extensive writing or discussion; term paper. Prerequisite: graduate status in art history or an allied field. Class size limited to 20 students. Issues accompanying the evolution and function of museums from cabinets of curiosities in sixteenth-century Europe to modern art centers. Examination of divergent motives behind collecting, exhibiting, and interpretation of objects. Investigation of museums' historical legacies and continuing philosophical dilemmas. Offered in alternate years. GE credit: ArtHum, Wrt.—Strazdes

**250. Problems in Art Historical Research (4)**

Seminar—3 hours; term paper. Major topics in art historical research, emphasizing special methods of investigation, and of historical and critical analysis. May be repeated for credit.

**254. Seminar in Classical Art (4)**

Seminar—3 hours; term paper. Selected areas of special study in classical art of the Greek and Roman tradition. Course may be repeated for credit with consent of instructor. —Roller

**263. Seminar in Chinese Art (4)**

Seminar—3 hours; term paper. Selected areas of special study in Chinese Art. May be repeated for credit with consent of instructor. —Burnett

**276. Seminar in Medieval Art (4)**

Seminar—3 hours; term paper. Selected areas of special study in medieval art from Early Christian to late Gothic. May be repeated for credit with consent of instructor.

**278. Seminar in Italian Renaissance Art (4)**

Seminar—3 hours; term paper. Selected areas of special study in Italian art from the fourteenth to the sixteenth century. May be repeated for credit with consent of instructor. Offered in alternate years.

**283. Seminar in Visual Culture and Gender (4)**

Seminar—3 hours; term paper. Selected areas of special study in the relationship between visual culture and gender in Europe and America from 1750 to present. May be repeated for credit with consent of instructor. Offered in alternate years.

**288. Seminar in European and American Architecture (4)**

Seminar—3 hours; term paper. Exploration of selected topics in European and American architectural history with concentration on the Modern Period. May be repeated for credit with consent of instructor. —Cogdell, Sadler, Strazdes

**290. Special Topics in Art History (4)**

Seminar—3 hours; term paper. Special research seminar in the theory or methods of Art History, or in a period of Art History. Topic will vary depending on the interests of the instructor or students. May be repeated for credit when topic differs and with consent of instructor. Offered irregularly.

**292. Internship (1-4)**

Internship—3-12 hours. Prerequisite: graduate student; consent of instructor. Restricted to graduate students in Art History only. Supervised internship at professional art or cultural institution including museums, galleries, archives, government offices, visual resources libraries, etc. May be repeated up to eight units for credit. Offered irregularly. (S/U grading only.)

**298. Directed Group Study (1-5)**

(S/U grading only.)

**299. Individual Study (1-6)**

(S/U grading only.)

**Professional**

Note: Various of the below courses are not offered each year.

**390. Introduction to Teaching Art History for Teaching Assistants (1)**

Discussion—1 hour. Designed for teaching assistants with emphasis on problems and procedures encountered by teachers of undergraduate art history. (S/U grading only.)

**396. Teaching Assistant Training Practicum (4)**

Seminar—2 hours; Practice—10 hours. Prerequisite: graduate standing. Principles and techniques of the effective teaching of undergraduate courses in the history of art. May be repeated for credit as often as the student is awarded a TA-ship. (S/U grading only.)

**Professional****401. Museum Training: Curatorial Principles (4)**

Seminar—3 hours. Approved for graduate degree credit. Study of private and public collections. Museum personalities. Appraisal of works of art; ethics of appraisal. Auction and sales: methods and catalogues. Registration. Technical problems of the museum. Connoisseurship. Collateral reading. Visits to museums. Seminar with assigned papers. —W.

**402. Museum Training: Exhibition Methods (4)**

Seminar—3 hours; exhibition. Approved for graduate degree credit. History of exhibition methods in private and public collections. Comparisons of different types of museums and their exhibition problems. Lighting and techniques of display with emphasis on actual design. Experimentation with unusual presentation forms.

**Art Studio**

(College of Letters and Science)

Hearne Pardee, M.F.A., Chairperson of the Department

**Department Office.** 101 Art Building  
530-752-0105; <http://art.ucdavis.edu>

**Faculty**

Tom Bills, M.F.A., Professor  
Robin Hill, B.F.A., Professor  
Darrin Martin, M.F.A., Associate Professor  
Hearne Pardee, M.F.A., Professor  
Lucy Puls, M.F.A., Professor

Annabeth Rosen, M.F.A., Professor  
 Youngsuk Suh, M.F.A., Assistant Professor  
 Gina Werfel, M.F.A., Professor

## Emeriti Faculty

Conrad Atkinson, R.A.S. (Honors), Professor Emeritus  
 William Henderson, M.F.A., Professor Emeritus  
 Lynn Hershman, M.A., Professor Emerita  
 Harvey Himelebar, M.A., Professor Emeritus  
*Academic Senate Distinguished Teaching Award*  
 David Hollowell, M.F.A., Professor Emeritus  
 Malaquias Montoya, B.F.A., Professor Emeritus  
 Maunel Neri, Professor Emeritus  
 Roland C. Petersen, M.A., Professor Emeritus  
 Cornelia Schulz, M.F.A., Professor Emerita  
*Academic Senate Distinguished Teaching Award*  
 Wayne Thiebaud, M.A., hon. D.F.A. (C.C.A.C., D.C.) Professor Emeritus, UC Davis Prize for Teaching and Scholarly Achievement

## The Major Program

The Studio Art Major provides the studio experience necessary for a broad understanding of the practice and interpretation of the visual arts.

**The Program.** The Art Studio program is designed to deliver a broad range of hands-on studio practices to the art major. Areas of focus include painting, sculpture, drawing, photography, ceramics, printmaking, and time-based media. Course choices/sequences are determined by the student according to major distribution requirements. Students are encouraged to explore a broad range of disciplines and are expected to take advantage of beginning classes which provide a critical introduction to the research possibilities within the major, across disciplines. In addition to studio classes, students are encouraged to participate in a distinguished visiting artist lecture series, professional practice seminars, student exhibitions/competitions, internships, and benefit from exposure to cultural events and exhibitions in Davis, Sacramento, and the Greater Bay Area.

**Portfolios.** While portfolios are not required for admission to the art major, students at all levels are expected to maintain current portfolios of completed work in order to qualify and compete for the numerous internships, fellowships, grants, awards, and exhibitions the program has to offer, as well as to better prepare for the rigors of graduate school and/or an independent studio practice.

**Career Options.** Graduates of the Studio Art Program attend prestigious post-baccalaureate and graduate programs in studio art. Alumni often go on to develop professional studio practices. Commitment to the development of one's studio work leads to exhibition opportunities as well as accomplishments in the realm of fellowships, commissions, collaborations, and a host of other professional projects and opportunities. For the student wishing to explore additional arts-related trajectories, in the private or public sector, a studio arts education provides a strong foundation for careers and/or graduate work in K-12 art education, art therapy, arts administration, curatorial studies, set design, architecture, culinary arts, design, film, animation, art criticism/journalism among others.

## A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter.....</b>	<b>24</b>
Four courses chosen from: Art Studio 2, 5, 7, 8, 9, 11, 12.....	16
Two lecture courses chosen from: Art Studio 24, 30, or Art History 1A, 1B, 1C, 1D, 1DV, 1E, 5, 10, 25 .....	8
<b>Depth Subject Matter .....</b>	<b>44</b>
36 upper division units in Art Studio.....	36
Any two upper division theory or history courses from: Art History, Cinema and Technocultural Studies, Design, Music or Theatre and Dance .....	8

## Total Units for the Major .....68

**Major Advisers.** Information on the current Academic Advisers can be obtained by contacting the Art Department Main Office at 530-752-0105 or at <http://art.ucdavis.edu>.

## Minor Program Requirements:

	UNITS
<b>Art Studio .....</b>	<b>20</b>

Prerequisite courses must be taken prior to enrollment in upper division courses. Independent study courses are not applicable.

Upper division art studio courses in two of the following areas: ..... 20  
 Area 1 (Painting, Drawing, Printmaking)  
 Area 2 (Sculpture and Ceramic Sculpture)  
 Area 3 (Photography and Video)  
 Note: One lower division substitute course permissible

## Teaching Credential Subject Representative.

See the Teacher Education program.

**Graduate Study.** The Department of Art offers programs of study and research leading to the M.F.A. degree in the practice of art. For more information contact the Graduate Staff Adviser at 530-752-8710 or at <http://art.ucdavis.edu>.

## Courses in Art Studio (ART)

### Lower Division

#### 2. Beginning Drawing (4)

Studio—6 hours. Introduction to drawing using various black and white media to articulate forms and organize space, with reference to historical and contemporary works. GE credit: ArtHum | AH, VL.—F, W, S, Su. (F, W, S, Su.) Pardee, Puls, Werfel

#### 5. Beginning Sculpture (4)

Studio—6 hours. Basic sculpture techniques using a variety of media. Form in space using cardboard, plaster, and/or cement, wood and/or metal and other media. GE credit: ArtHum | AH, VL.—F, W, S, (F, W, S, J) Bills, Hill, Puls

#### 7. Beginning Painting (4)

Studio—6 hours. Introduction to techniques and concepts in the practice of painting. GE credit: AH, VL.—F, W, S, (F, W, S, J) Pardee, Werfel

#### 8. Beginning Ceramic Sculpture (4)

Studio—6 hours. Introduction to ceramic sculpture construction and processes. Large scale hand-building, glazing, kilns and kiln firing technology. GE credit: ArtHum | AH, VL.—Rosen

#### 9. Beginning Photography (4)

Studio—6 hours. Introduction to the fundamental technical, aesthetic, and formal aspects of photography. Camera skills, film developing and printing in the black and white darkroom. GE credit: ArtHum | AH, VL.—Suh

#### 10. Introduction to Art Appreciation (3)

Lecture—3 hours. The understanding and appreciation of painting, sculpture, architecture and industrial art. Illustrated lectures. Intended for non-majors. GE credit: ArtHum | AH, VL.

#### 11. Beginning Printmaking (4)

Studio—6 hours. Introduction to printmaking techniques such as monography, relief, and intaglio. Investigation of personal imagery through use of these techniques. GE credit: ArtHum | AH, VL.

#### 12. Beginning Video (4)

Studio—6 hours. Production techniques of video shooting, editing, lighting, sound and effects. A conceptual framework for video-art techniques. GE credit: ArtHum | AH, VL.—Martin

#### 24. Introduction to Experimental Video and Film (4)

Lecture—3 hours; discussion—1 hour; term paper. Evolution of moving image technologies. Shifts within avant-garde artistic practices. Conceptual and historical differences between film and video. Offered in alternate years. GE credit: ArtHum | AH, VL, WE.—(F,) Martin

## 30. Introduction to Contemporary Visual Culture (4)

Lecture—3 hours; discussion/laboratory—1 hour. Establishing visual literacy across the media of fine art, photography, advertising, television and film; media culture; focus on critical decoding of contemporary visual culture. Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, VL.—F, W, (F, W,) Pardee

#### 98. Directed Group Study (1-5)

Prerequisite: consent of instructor. Restricted to lower division students. (P/NP grading only.)

#### 99. Special Study for Undergraduates (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division

Pre-enrollment in upper division courses is restricted to art majors.

#### 101. Intermediate Painting (4)

Studio—6 hours. Prerequisite: courses 2, 7. Individualized projects exploring color and space in a variety of subject matter and approaches. Builds on basic skills and concepts from beginning drawing and painting courses. Study of historical and contemporary art in relation to studio practice. May be repeated one time for credit when topic differs. GE credit: ArtHum | AH, VL.—F, W, S, (F, W, S,) Pardee, Werfel

#### 102A. Advanced Painting: Studio Projects (4)

Studio—6 hours. Prerequisite: course 101. Pass One restricted to Art Studio majors. Sustained development of painting for advanced students. Approaches will vary according to the instructor. May be repeated for credit one time. GE credit: ArtHum | AH, VL.—Pardee, Werfel

#### 102B. Advanced Painting: Figure (4)

Studio—6 hours. Prerequisite: course 101. Pass One restricted Art Studio majors. Advanced painting using the human figure as subject. May be repeated for credit one time. GE credit: ArtHum | AH, VL.—Pardee, Werfel

#### 102C. Advanced Painting: Special Topics (4)

Studio—6 hours. Prerequisite: courses 2, 7, 101; course 102A or 102B. Pass One restricted to Art Studio majors. Special topics in painting for upper division students. Emphasis on development of a personal practice of painting informed by awareness of contemporary issues in painting and their historical background. Topics will vary with instructor. May be repeated for credit one time. GE credit: ArtHum | AH, VL.—Pardee, Werfel

#### 103A. Intermediate Drawing: Black and White (4)

Studio—6 hours. Prerequisite: courses 2. Pass One restricted to Art Studio majors. Advanced study of drawing composition using black and white media. GE credit: ArtHum | AH, VL.—Pardee, Werfel

#### 103B. Intermediate Drawing: Color (4)

Studio—6 hours. Prerequisite: courses 2. Pass One restricted to Art Studio majors. Study of drawing composition in color media. GE credit: ArtHum | AH, VL.—Pardee, Werfel

#### 105A. Advanced Drawing: Studio Projects (4)

Studio—6 hours. Prerequisite: courses 2; course 103A or 103B. Pass One restricted to Art Studio majors. Exploration of composition and process in drawing. Emphasis on the role of drawing in contemporary art and on drawing as an interdisciplinary practice. May be repeated for credit one time. GE credit: ArtHum | AH, VL.—Pardee, Werfel

#### 105B. Advanced Drawing: Figure (4)

Studio—6 hours. Prerequisite: courses 4; course 103A or 103B. Pass One restricted to Art Studio majors. Study of the figure through drawing of the model. Exploration of different methods and process of figure-drawing. May be repeated for credit one time. GE credit: ArtHum | AH, VL.—Pardee, Werfel

**110A. Intermediate Photography: Black and White Analog (4)**

Studio—6 hours. Prerequisite: course 9. Pass One restricted to Art Studio majors. Introduction to 35mm and medium format camera. Development of personal aesthetic and portfolio of black and white prints. GE credit: ArtHum | AH, VL.—Suh

**110B. Intermediate Photography: Digital Imaging (4)**

Studio—6 hours. Prerequisite: course 9. Pass One restricted to Art Studio majors. Comprehensive introduction to all elements of digital photography, including scanning, imaging software and printing. GE credit: ArtHum | AH, VL.—Suh

**111A. Advanced Photography: Special Topics (4)**

Studio—6 hours. Prerequisite: courses 9 and 110A. Pass One restricted to Art Studio majors. Special topics related to photography and contemporary art practice. Multiple projects in a variety of approaches. May be repeated two times for credit when topic differs. GE credit: ArtHum | AH, VL.—Suh

**111B. Advanced Photography: Digital Imaging (4)**

Studio—6 hours. Prerequisite: course 9 and 110B. Pass One restricted to Art Studio majors. In-depth exploration of digital photography, including refined digital imaging techniques. Theoretical issues involved in digital media. May be repeated for credit one time. GE credit: ArtHum | AH, VL.—Suh

**112. Sound for Vision (4)**

Studio—6 hours. Prerequisite: course 12 or Technocultural Studies 100. Pass One restricted to Art Studio majors. Sound composition and development of an audio databank. Study of repetition and phase shifts. Creation of descriptive acoustic space recordings in combination with other artistic media. Audio as stand alone or accompaniment. May be repeated for credit one time. GE credit: ArtHum | AH.—Martin

**113. Interdisciplinarity Art (4)**

Studio—6 hours. Prerequisite: Upper division standing in Art Studio, Theater and Dance, Design, Technocultural Studies, or Music. Experimental interdisciplinary strategies. Use of various media in creation of collaborative or independent works. Production of participatory audio-visual works, installations, or two dimensional explorations. May be repeated for credit one time. GE credit: ArtHum | AH, VL.—Hill, Martin, Puls, Suh

**114A. Intermediate Video: Animation (4)**

Studio—6 hours. Prerequisite: course 12 or Technocultural Studies 100; one drawing course. Pass One restricted to Art Studio majors. Exploration of animation. Relationship between drawing, digital stills, and multiple images. Animation using traditional drawing techniques, collage, and digital processes. May be repeated for credit one time. GE credit: ArtHum | AH, VL.—Martin

**114B. Intermediate Video: Experimental Documentary (4)**

Studio—6 hours. Prerequisite: course 12 or Technocultural Studies 100. Pass One restricted to Art Studio majors. Experimental documentary practice. Use of interviews, voice-overs, and still and moving images. Production of alternative conceptual and visual projects. May be repeated for credit one time. GE credit: ArtHum | AH, VL.—Martin

**114C. Intermediate Video: Performance Strategies (4)**

Studio—6 hours. Prerequisite: course 12 or Technocultural Studies 100. Pass One restricted to Art Studio majors. Use of video to expand performance art production. Exploration of improvisation, direction, projection, and image processing in real time. May be repeated for credit one time. GE credit: ArtHum | AH, VL.—Martin

**117. Advanced Video and Electronic Arts (4)**

Studio—6 hours. Prerequisite: course 12 or Technocultural Studies 100; one of the following: course 112, 114A, 114B, or 114C; upper division stand-

ing Art Studio majors. Pass One restricted to Art Studio majors. Independently driven video, digital, and/or performance projects. Further development in the electronic arts ranging from video installation to performance. May be repeated for credit one time. GE credit: ArtHum | AH, VL.—Martin

**121. Reinterpreting Landscape (4)**

Studio—6 hours. Prerequisite: courses 2, 7. Pass One restricted to Art Studio majors. Interpretation of landscape through painting, drawing, and related media. Emphasis on the integration of historical, cultural, natural, and artistic contexts. May be repeated for credit one time. GE credit: ArtHum | AH, VL.—Pardee, Werfel

**125A. Intermediate Printmaking: Relief (4)**

Studio—6 hours. Prerequisite: course 11. Pass One restricted to Art Studio majors. Woodcut linocut, metal-plate, relief, and experimental uses of other materials for printmaking. Additive and reductive relief techniques. May be repeated for credit one time. GE credit: ArtHum | AH, VL.

**125B. Intermediate Printmaking: Intaglio (4)**

Studio—6 hours. Prerequisite: course 11. Pass One restricted to Art Studio majors. Metal plate etching, aquatint, hard and soft ground, burin engraving and related printmaking techniques. May be repeated for credit one time. GE credit: ArtHum | AH, VL.

**125C. Intermediate Printmaking: Lithography (4)**

Studio—6 hours. Prerequisite: course 11. Pass One restricted to Art Studio majors. Stone and metal-plate lithography and other planographic printmaking methods. Exploration of the basic chemistry and printing procedure inherent in stone lithography. May be repeated for credit one time. GE credit: ArtHum | AH, VL.

**125D. Intermediate Printmaking: Serigraphy (4)**

Studio—6 hours. Prerequisite: course 11. Pass One restricted to Art Studio majors. Printmaking techniques in silk screen and related stencil methods. Development of visual imagery using the language of printmaking. May be repeated for credit one time. GE credit: ArtHum | AH, VL.

**129. Advanced Printmaking (4)**

Studio—6 hours. Prerequisite: completion of two of 125A, 125B, 125C, or 125D. Pass One restricted to Art Studio majors. Development of intermedia printmaking. Advanced modes in print technologies: relief, serigraphy, intaglio, surface, as well as addition of digitized imagery. Production of prints using multi-plate prints and other methods. May be repeated for credit two times. GE credit: ArtHum | AH, VL.

**138. The Artist's Book (4)**

Studio—6 hours. Prerequisite: completion of three upper division Art Studio courses. Pass One restricted to Art Studio majors. Creation of an artist's book in an edition of three. Use of a variety of media. May be repeated for credit one time. Offered in alternate years. GE credit: ArtHum | AH, VL.—Hill, Suh

**142A. Intermediate Ceramic Sculpture: Industrial Production Methods (4)**

Studio—6 hours. Prerequisite: course 8. Pass One restricted to Art Studio majors. Ceramic sculpture creation using two forms of industrial processes: plaster mold design, fabrication and casting; and extrusion with dies, including die fabrication. May be repeated one time for credit. GE credit: ArtHum | AH, VL.—Rosen

**142B. Intermediate Ceramic Sculpture: Material Study (4)**

Studio—6 hours. Prerequisite: course 8. Pass One restricted to Art Studio majors. Study of ceramic materials and processes. Areas studied include clay and clay bodies; glaze materials through temperature, color and texture; history and technology of kilns and kiln firing. Examination of material proper-

ties and characteristics through experimentation. May be repeated one time for credit. GE credit: ArtHum | AH, VL.—Rosen

**142C. Intermediate Ceramic Sculpture: Special Topics (4)**

Studio—6 hours. Prerequisite: course 8. Pass One restricted to Art Studio majors. Exploration of the ceramic surface for creative expression. Use of glazing techniques including china paint, decals, luster, and silkscreen with underglaze and overglaze as well as the use of common materials such as epoxy, paint, oil and wax. May be repeated two times for credit. GE credit: ArtHum | AH, VL.—Rosen

**143B. Advanced Ceramic Sculpture: Issues in Contemporary Ceramics (4)**

Studio—6 hours. Prerequisite: course 8; 142A or 142B. Pass One restricted to Art Studio majors. Individual studio work in conjunction with readings, field trips, critiques and writing about contemporary ceramic art. May be repeated for credit two times. GE credit: ArtHum | AH, VL.—Rosen

**147. Theory and Criticism of Photography (4)**

Lecture—3 hours; term paper. Prerequisite: course 9. Development of camera vision, ideas, and aesthetics and their relationship to the fine arts from 1839 to the present. Offered in alternate years. GE credit: ArtHum, Wrt | AH, VL.—Suh

**148. Theory and Criticism: Painting and Sculpture (4)**

Lecture—3 hours; term paper. Prerequisite: course 5 or 7 recommended. Study of forms and symbols in historic and contemporary masterpieces. (Same course as Art History 148.) Offered in alternate years. GE credit: ArtHum, Wrt | AH, VL, WE.—Pardee

**149. Introduction to Critical Theory (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: two of Art History 1B, 1C, or 183F. An overview of 20th century critical theories of culture and their relation to visual art and mass media culture. Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, VL.

**150. Theory and Criticism of Electronic Media (4)**

Lecture—3 hours; term paper. Prerequisite: course 24 recommended. Study of electronic media, focusing on critique, application, and relationship to art practice. Analysis of the conceptual basis of electronic media as an artistic mode of expression. Offered in alternate years. GE credit: ArtHum, Wrt | AH.—Martin

**151. Intermediate Sculpture (4)**

Studio—6 hours. Prerequisite: course 5. Individualized explorations through multiple projects in a variety of sculpture media and techniques. Builds upon technical skills and concepts covered in course 5. May be repeated two times for credit when topic differs. GE credit: ArtHum | AH, VL.—F, W, S. (F, W, S.) Bills, Hill, Puls

**152A. Advanced Sculpture: Studio Projects (4)**

Studio—6 hours. Prerequisite: course 5; 151. Pass One restricted to Art Studio majors. Sculpture for advanced students. Emphasis on concept, idea development and honing technical skills. Approaches and projects will vary according to the instructor. May be repeated for credit one time when topic differs. GE credit: ArtHum | AH, VL.—Bills, Hill, Puls

**152B. Advanced Sculpture: Material Explorations (4)**

Studio—6 hours. Prerequisite: course 5; 151. Pass One restricted to Art Studio majors. Primary application and exploration of a single sculpture material chosen by the student. Examination of its properties, qualities, and characteristics for three-dimensional expression. May be repeated for credit one time. GE credit: ArtHum | AH, VL.—Puls

**152C. Advanced Sculpture: Concepts (4)**

Studio—6 hours. Prerequisite: course 5; 151. Pass One restricted to Art Studio majors. Investigation of a specific idea chosen by the class. Relationship of idea to form and content. Individual development of conceptual awareness. May be repeated for credit one time. GE credit: ArtHum | AH, VL.—Puls

**152D. Advanced Sculpture: Metals (4)**

Studio—6 hours. Prerequisite: course 5; 151. Pass One restricted to Art Studio majors. Technical aspects of the use of metals in contemporary art practice. Projects assigned to demonstrate the evolution of concepts and processes. May be repeated for credit one time. GE credit: ArtHum | AH, VL.—Bills

**152E. Advanced Sculpture: Site Specific Public Sculpture (4)**

Studio—6 hours. Prerequisite: course 5; 151. Pass One restricted to Art Studio majors. Place and site specificity in contemporary sculpture. Individual and group work to conceive and fabricate sculpture in a public space. May be repeated for credit one time. GE credit: ArtHum | AH, VL.—Hill

**152F. Advanced Sculpture: Figure (4)**

Studio—6 hours. Prerequisite: course 5; 151. Pass One restricted to Art Studio majors. Exploration of historical and contemporary approaches to the body in three-dimensions. Projects based on observational and conceptual strategies. Variety of media and techniques, including clay, wax, plaster, plastics, found objects, and others. May be repeated for credit one time. GE credit: ArtHum | AH, VL.

**152G. Advanced Sculpture: The Miniature and Gigantic (4)**

Studio—6 hours. Prerequisite: course 5; 151. Pass One restricted to Art Studio majors. Exploration of scale, from the very small to the very large in a series of projects in a variety of media. Tools and techniques of enlargement and miniaturization. May be repeated for credit one time. GE credit: ArtHum | AH, VL.

**171. Mexican and Chicano Mural Workshop (4)**

Studio—8 hours; independent study—1 hour. Prerequisite: Chicana/o Studies 70; consent or instructor. The Mural: a collective art process that empowers students and people through design and execution of mural paintings in the tradition of the Mexican Mural Movement; introduces materials and techniques. May be repeated one time for credit. (Same course as Chicana/o Studies 171.) GE credit: ArtHum | AH, VL.—S. (S.)

**190. Seminar in Art Practice (4)**

Studio—6 hours. Prerequisite: upper division standing Art Studio major. Pass One restricted to Art Studio majors. Introduction to professional practices. Development of an artist's packet including a resume, cover letter, artist statement, and statement of purpose. Ongoing independent studio work with group critiques. Research on galleries and museums, and readings in contemporary theory and criticism. GE credit: ArtHum | AH, VL, WE.—F, W, S. (F, W, S.) Hill, Puls, Rosen, Werfel

**192. Internship (2-12)**

Internship. Supervised program of internships in artists' studios and at professional art institutions such as museums, galleries, and art archives including collections of slides and photographs. May be repeated for credit for a total of 12 units. (P/NP grading only.)

**195. Expanded Field: Artist Lecture Series (1)**

Lecture/discussion—3 hours. Prerequisite: consent of instructor. Exploration of the expanded field of practice, theory and criticism in the visual arts. Presentations and discussions with professional practitioners in the field. May be repeated up to 12 units for credit when topic differs. (P/NP grading only.)—F, W, S. (F, W, S.) Hill

**198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate****290. Seminar (4)**

Seminar—3 hours. Original works produced for group discussion and criticism; associated topics of a contemporary and historical nature. May be repeated for credit.—F, W, S. (F, W, S.)

**291. Seminar: Critical Evaluation (1)**

Seminar—1 hour. May be repeated for credit. (S/U grading only.)—W. (W.)

**292. Seminar: Comprehensive Qualifying (1)**

Seminar—1 hour. Further critical evaluation of the student's work to determine his eligibility to begin the Comprehensive Project. May be repeated for credit. (S/U grading only.)—(F.)

**299. Individual Study (1-6)**

(S/U grading only.)

**299D. Comprehensive Project (9)**

An original body of work accompanied by a catalog summarizing the student's aesthetic position. May be repeated for credit. (S/U grading only.)—S. (S.)

**Professional**

Note: Various of the below courses are not offered each year.

**401. Museum Training: Curatorial Principles (4)**

Seminar—3 hours; papers. Approved for graduate degree credit. Study of private and public collections. Museum personalities. Appraisal of works of art; ethics of appraisal. Auction and sales: methods and catalogues. Registration. Technical problems of the museum. Connoisseurship. Collateral reading. Visits to museums. Offered in alternate years.

**402. Museum Training: Exhibition Methods (4)**

Seminar—3 hours; exhibition. Approved for graduate degree credit. History of exhibition methods in private and public collections. Comparisons of different types of museums and their exhibition problems. Lighting and techniques of display with emphasis on actual design. Experimentation with unusual presentation forms. Offered in alternate years.

## Asian American Studies

(College of Letters and Science)

Richard S. Kim, Ph.D., Chairperson of the Department

**Program Office.** 3102 Hart Hall  
530-752-2069; <http://asa.ucdavis.edu>

**Faculty**

Darrell Y. Hamamoto, Ph.D., Professor  
Wendy Ho, Ph.D., Senior Lecturer  
Richard S. Kim, Ph.D., Associate Professor  
Sunaina Maira, Ed.D., Professor  
Susette Min, Ph.D., Associate Professor  
Robyn Rodriguez, Ph.D., Associate Professor  
Caroline Kieu Linh Valverde, Ph.D., Associate Professor  
Nolan Zane, Ph.D., Professor

**Emeriti Faculty**

Isao Fujimoto, Ph.D., Senior Lecturer Emeritus  
Bill Ong Hing, J.D., Professor Emeritus  
Stanley Sue, Ph.D., Professor Emeritus

**The Major Program**

The Asian American Studies Program offers an interdisciplinary major that examines the experiences of various Asian American groups in the United States. Pertinent to these experiences are the historical, cul-

tural, legal, political, social-psychological, class, racial, and gender contexts for Asian Americans.

**The Program.** Majors take a prescribed set of lower division and upper division courses in Asian American Studies. These courses offer diverse theoretical and methodological tools to develop and encourage student critical thinking, creativity, initiative, and independent research about a complex, multiethnic and racialized society in the United States and in a global world.

**Career Alternatives.** Asian American Studies prepares students for a variety of careers. Given the multicultural nature of society and the increasing relations with different societies, many occupations seek individuals with background and expertise in ethnic relations and cultural issues. Graduates often enter the fields of teaching, research, government service, law, social services, etc., as well as graduate schools for advanced degrees in various disciplines.

**A.B. Major Requirements:**

UNITS

**Preparatory Subject Matter .....** 32

Asian American Studies 1, 2, 3, and 4 .....	16
--	----

At least two lower division courses from the following departments or programs:

At least two lower division courses from the following departments or programs: African American and African Studies (AAS), American Studies (AMS), Chicana/o Studies (CHI), Middle East and South Asia Studies (ME/SA), Native American Studies (NAS), Women and Gender Studies (WGS) (all lower division courses of at least 4 units are acceptable except those numbered 92, 97T, 98, and 99) .....	8
--	---

Methodology .....

At least two courses from any of the following methods courses:

African American and African Studies 101; American Studies 100; Anthropology 13; Art History 5, 100 Art Studio 10, 30; Chicana/o Studies 23; English 42, 110A, 110B; History 101; Human Development 120; Native American Studies 46; Philosophy 5; Political Science 51; Psychology 41; Sociology 46A, 46B; Statistics 13; Women and Gender Studies 104.	
--	--

**Depth Subject Matter .....** 36

Asian American Studies 192 Community Internship (required) .....	4
--	---

**Major Emphasis**

As part of the depth subject matter requirement, all Asian American Studies majors must develop a major emphasis by choosing either a disciplinary or thematic specialization in consultation with the Student Affairs Officer (SAO) and/or faculty advisers. The major emphasis must include six Asian American Studies upper-division courses and two upper-division elective courses from other departments or programs.

At least six upper-division Asian American Studies courses .....

Asian American Studies 100, 102, 112, 113, 114, 115, 116, 121, 130, 131, 132, 140, 141, 150, 150B, 150C, 150D, 150E, 150F, 155, 189A, 189B, 189C, 189D, 189E, 189F, 189G, 189H, 189I, 194/195, 198 (1-5 units), 199 (1-5 units).	
--	--

Up to six units in Asian American Studies 198 and/or Asian American Studies 199 can be used to satisfy the Asian American Studies upper division course requirements.

At least two upper-division elective courses from other departments or programs that relate to chosen emphasis .....

Two courses (of up to eight units) from Study Abroad can be substituted for major	8
---	---

requirements upon approval from the SAO or faculty adviser.

### Total Units for the Major ..... 68

**Major Adviser.** Joe Nguyen, Student Affairs Officer (SAO), 530-752-8617 or [jovnguyen@ucdavis.edu](mailto:jovnguyen@ucdavis.edu)

Substitutions for disciplinary track courses will be considered by the Program Director on a case by case basis. Likewise, any substitutions of Major/Minor criteria will be considered by the Program Director.

### Minor Program Requirements:

Asian American Studies	UNITS
Two courses from Asian American Studies 1, 2, 3, or 4 ..... 8	8

Five courses from:

Asian American Studies 100, 102, 112, 113, 114, 115, 116, 121, 130, 131, 132, 140, 141, 150, 150B, 150C, 150D, 150E, 150F, 155, 189A, 189B, 189C, 189D, 189E, 189F, 189G, 189H, 189I, 192, 198, and 199 (no more than 4 units of 192, 198, and 199 may be counted toward this total) ..... 20

**Minor Adviser.** Joe Nguyen, Student Affairs Officer (SAO), 530-752-8617 or [jovnguyen@ucdavis.edu](mailto:jovnguyen@ucdavis.edu)

**American History and Institutions.** This university requirement can be satisfied by one of the following courses in Asian American Studies: 1, 2; see also under University Requirements.

### Courses in Asian American Studies (ASA)

Direct questions pertaining to the following courses to the instructor or to Asian American Studies Department in 3102 Hart Hall 530-723-9767.

### Lower Division

#### 1. Historical Experience of Asian Americans (4)

Lecture—3 hours; discussion—1 hour. Introduction to Asian American Studies through an overview of the history of Asians in America from the 1840s to the present within the context of the development of the United States. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, VL, WC, WE.—F, S.

#### 2. Contemporary Issues of Asian Americans (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Introduction to Asian American Studies through the critical analysis of the impact of race, racism, ethnicity, imperialism, militarism, and immigration since post-World War II on Asian Americans. Topics may include sexuality, criminality, class, hate crimes, and inter-ethnic relations. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, VL, WC, WE.—F, W, S.

#### 3. Social and Psychological Perspectives of Asian Americans (4)

Lecture—3 hours; discussion—1 hour. Major psychosocial issues of Asian Americans. Theories and empirical research that address cultural values, behavioral norms, ethnic stereotypes, racism, acculturation, ethnic identity development, family communication, stressors and social support systems, academic achievement, interpersonal effectiveness, and psychopathology. GE credit: SocSci, Div | ACGH, DD, SS.—W, S.

#### 4. Asian American Cultural Studies (4)

Lecture—3 hours; discussion—1 hour. This interdisciplinary course examines the multiple ways in which race, class, sexuality and gender, as well as the recent turn to transnationalism and postcolonial theory, have changed the ways we read Asian American literature and see art, theater and film. GE credit: ArtHum, Div, Wrt | ACGH, AH, DD, OL, VL, WE.—F, W, S.

#### 92. Internship (1-3)

Internship—3-9 hours. Prerequisite: enrollment dependent on availability of intern positions and consent of instructor. Supervised internship in community and institutional settings related to Asian American concerns. (P/NP grading only.)

#### 98. Directed Group Study (1-5)

Primarily intended for lower division students. (P/NP grading only.)

#### 98F. Student Facilitated Course (1-4)

Student-facilitated (taught) course intended for lower division students. Offered irregularly. (P/NP grading only.)

#### 99. Special Study for Undergraduates (1-5)

(P/NP grading only.)

### Upper Division

#### 100. Asian American Communities (4)

Lecture/discussion—4 hours. Survey and analysis of Asian American communities within both historical and contemporary contexts. Presentation of the analytical skills, theories, and concepts needed to describe, explain, and understand the diversity of Asian American communities within the larger, dominant society. GE credit: ArtHum or SocSci, Div | ACGH, AH or SS, DD, WE.—S. (S.) Hamamoto, Kim, Maira

#### 102. Theoretical Perspective in Asian American Studies (4)

Lecture/discussion—4 hours. Prerequisite: course 1, 2, 3, or 4 or consent of instructor; upper division standing. Explores major theories of race and its intersections with class, gender, and sexuality from interdisciplinary perspective. Introduces key theoretical developments, issues, debates. Through case studies, analyzes ways various theoretical frameworks and perspectives have been incorporated into range of scholarship. GE credit: SocSci, Div.—F, Su. (F, Su.) Ho, Kim, Valverde

#### 112. Asian American Women (4)

Lecture/discussion—4 hours. Experiences of Asian American women from major ethnic subgroups comparatively examined in their social, economic and historical contexts using theoretical perspectives from social sciences, humanities/arts: identity, racialization, immigration, gender, sexuality, labor, socialization, cultural expression, social movements and feminist theorizing. GE credit: ArtHum or SocSci, Div | ACGH, AH or SS, DD, VL, WC, WE.—F. (F.) Ho

#### 113. Asian American Sexuality (4)

Lecture/discussion—4 hours. Restrictive US immigration laws, labor exploitation, race-based exclusionary laws, removal and internment, anti-miscegenation laws, and other examples of social control are surveyed to assess their role in shaping the sexuality of the different Asian American groups. Offered irregularly. GE credit: ArtHum or SocSci | ACGH, AH or SS, DD, WC, WE.—W. (W.) Hamamoto

#### 114. Asian Diasporas (4)

Lecture—4 hours. Asian diasporic communities and the experiences of its members in the United States and internationally. Community building, cyberspace, gender issues, labor, transnational practices, effects of globalization, political organizing, homeland politics, humanitarian projects, citizenship and nationalism. Offered in alternate years. GE credit: SocSci, Div | ACGH, DD, SS, WC.—F. (F.) Kim, Valverde

#### 115. Multiracial Asian Pacific American Issues (4)

Lecture/discussion—4 hours. Introduction to the experiences of biracial and multiracial Asian Pacific people in the U.S., concentrating on theories of race, racial identity formation, culture, media, and anti-racist struggles. Critical approaches to the analysis of popular media and academic representations. Offered in alternate years. GE credit: SocSci, Div | ACGH, DD, OL, SS, WC, WE.—Valverde

#### 116. Asian American Youth (4)

Lecture—3 hours; term paper. Social experiences of diverse groups of Asian American youth. Ways in which youth themselves actively create cultural expressions and political interventions. GE credit: ArtHum or SocSci, Div | ACGH, AH or SS, DD, OL, WE.—Maira

#### 121. Asian American Performance (4)

Lecture/discussion—4 hours. Performance work by, for, and/or about Asian Pacific Americans including dramatic literature, performance art, dance, and film. Ethnicity, gender and sexuality, class and age as they intersect with Asian Pacific American identities in and through dramatic performance. Offered in alternate years. GE credit: ArtHum | ACGH, AH, DD, OL, WE.—W. Min, See

#### 130. Asian American Literature (4)

Lecture/discussion—4 hours. Works of Asian American literature by writers from the major ethnic subgroups, examined in their social, economic and historical contexts. Intertextual analysis of their thematic and formal elements to form an understanding of Asian American literary traditions. GE credit: ArtHum, Div | ACGH, AH, DD, OL, WE.—S. (S.) Ho, Min

#### 131. Ethnicity, Culture, and the Self (4)

Lecture—3 hours; discussion—1 hour. Cultural and social psychological influences on Asian Americans focusing on the individual. GE credit: SocSci, Div | ACGH, DD, SS.—Zane

#### 132. Health Issues Confronting Asian Americans and Pacific Islanders (4)

Lecture/discussion—4 hours. Health issues confronting Asian Americans and Pacific Islanders. (Same course as Public Health Sciences 132.) GE credit: SocSci | SS.

#### 140. Asian Americans and Media (4)

Lecture—4 hours. Prerequisite: course 1 or 2. Upper division standing. The politics of Asian American representation in print, radio, television, film, and new media will be examined in tandem with sustained discussion of alternatives offered by independent Asian American media arts. GE credit: ArtHum, SocSci, Div, Wrt.—F. (F.) Hamamoto, Maira

#### 141. Asian Americans and the Political Culture of Fashion in the U.S. and Asia (4)

Lecture—4 hours; term paper; project. Prerequisite: course 1; course 2, 3, or 4 or consent of instructor. Historical, cultural and sociopolitical development of fashion in Asia and the U.S. as it relates to the Asian Diasporas. Specific aspects of material culture: textiles, clothing and fashion. Offered in alternate years. GE credit: ArtHum, SocSci, Div | ACGH, AH or SS, DD, OL, VL, WC, WE.—F. Valverde

#### 150. Filipino American Experience (4)

Lecture/discussion—4 hours. Examination of the relationship between the Filipino-American community, the Philippine home community and the larger American society through a critical evaluation of the historical and contemporary conditions, problems and prospects of Filipinos in the U.S. GE credit: SocSci | ACGH, DD, SS, WC.—S. (S.) Rodriguez

#### 150B. Japanese American Experience (4)

Lecture—3 hours; term paper. Analytical approaches to understanding Japanese American history, culture and society. Offered in alternate years. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, VL, WC, WE.—W. Hamamoto

#### 150C. Chinese American Experience (4)

Lecture/discussion—4 hours. Survey of the historical and contemporary experiences of Chinese in the United States, starting with the gold rush era and concluding with the present-day phenomenon of Chinese transnational movement to the United States and its diasporic significance. Offered in alternate years. GE credit: ArtHum or SocSci, Div | ACGH, AH or SS, DD, VL, WC.—Ho

#### 150D. Korean American Experience (4)

Lecture/discussion—4 hours. Interdisciplinary survey of the historical and contemporary experiences of Koreans in the United States from the late nineteenth

century to the present. Offered in alternate years. GE credit: ArtHum or SocSci, Div | ACGH, AH or SS, DD, WC. —Kim

#### **150E. Southeast Asian American Experience (4)**

Lecture/discussion—4 hours. Upper division status. Historical survey of Southeast Asian experiences with special focus on United States involvement and post 1975 migrations. Defines international and transnational conditions that led up to the large exodus and resettlement of Southeast Asians. Offered in alternate years. GE credit: ArtHum or SocSci, Div | ACGH, AH or SS, DD, OL, WC, WE. —S. Valverde

#### **150F. South Asian American History, Culture, & Politics (4)**

Lecture/discussion—4 hours. South Asian American experiences, focusing on the histories, cultures, and politics of Indian, Pakistani, Bangladeshi, and Sri Lankan communities in the U.S. Interdisciplinary approaches to migration, labor, gender, racialization, ethnicity, youth, community mobilization. Offered in alternate years. GE credit: ArtHum, SocSci, Div | ACGH, AH or SS, DD, OL, WE. —W. Maira

#### **155. Asian American Legal History (4)**

Lecture/discussion—4 hours. Legal history of Asian Americans, from the mid-19th century to present. Laws and administrative policies affecting Asian American communities, including those governing immigration, social and economic participation, WWII internment, and affirmative action. Offered irregularly. GE credit: SocSci | ACGH, DD, SS.

#### **189A. Topics in Asian American Studies: History (4)**

Lecture—4 hours. Intensive treatment of a topic in Asian American Studies; history. May be repeated for credit when topic differs. Offered irregularly. GE credit: SocSci | ACGH, DD, SS, WC.

#### **189B. Topics in Asian American Studies: Culture (4)**

Lecture—4 hours. Intensive treatment of a topic in Asian American Studies; culture. May be repeated for credit when topic differs. Offered irregularly. GE credit: ArtHum or SocSci | AH or SS.

#### **189C. Topics in Asian American Studies: Physical and Mental Health (4)**

Lecture—4 hours. Intensive treatment of a topic in Asian American Studies. Health. May be repeated for credit when topic differs. Offered irregularly. GE credit: SocSci | SS.

#### **189D. Topics in Asian American Studies: Policy and Community (4)**

Lecture—4 hours. Intensive treatment of a topic in Asian American Studies; policy and community. May be repeated for credit when topic differs. Offered irregularly. GE credit: SocSci | ACGH, DD, SS.

#### **189E. Topics in Asian American Studies: Comparative Racial Studies (4)**

Lecture—4 hours. Intensive treatment of a topic in Asian American Studies; comparative race studies. May be repeated for credit when topic differs. Offered irregularly. GE credit: ArtHum or SocSci | ACGH, AH or SS, DD, OL, WE.

#### **189F. Topics in Asian American Studies: Asian Studies and Asian American Studies (4)**

Lecture—4 hours. Intensive treatment of a topic in Asian American Studies; asian and asian american studies. May be repeated for credit when topic differs. Offered irregularly. GE credit: SocSci | SS.

#### **189G. Topics in Asian American Studies: Race, Class, Gender, and Sexuality (4)**

Lecture—4 hours. Intensive treatment of a topic in Asian American Studies; race, class, gender, and sexuality. May be repeated for credit when topic differs. Offered irregularly. GE credit: SocSci | SS.

#### **189H. Topics in Asian American Studies: Society and Institutions (4)**

Lecture—4 hours. Intensive treatment of a topic in Asian American Studies. society and institutions. May be repeated for credit when topic differs. GE credit: ArtHum or SocSci | AH or SS.

#### **189I. Topics in Asian American Studies: Politics and Social Movements (4)**

Lecture—4 hours. Intensive treatment of a topic in Asian American Studies: politics and social movements. May be repeated for credit when topic differs. Offered irregularly. GE credit: ArtHum or SocSci | ACGH, AH or SS, DD, OL, WE.

#### **192. Internship (1-5)**

Internship—3-15 hours. Prerequisite: enrollment dependent on availability of intern position with priority to Asian American Studies minors. Supervised internship in community and institutional settings related to Asian American concerns. (P/NP grading only.)

#### **194. Asian American Studies Capstone Course (4)**

Lecture/discussion—4 hours; project; extensive writing. Open to junior or senior level standing in Asian American Studies or consent of instructor. Synthesis of the approaches and methods learned by students in Asian American Studies and development of specialization in their areas of interest. Development of a research proposal for thesis project. —F, W, S. (F, W, S.)

#### **195. Asian American Studies Senior Thesis Seminar (4)**

Lecture/discussion—3 hours; project; extensive writing. Restricted to junior and senior level standing in Asian American Studies. Completion of ASA 194 required. Synthesis of the approaches and methods learned in Asian American Studies. Production of an original research paper on a topic of student's interest, building on the research proposal submitted in the capstone seminar. —W, S. (W, S.)

#### **197T. Tutoring in Asian American Studies (1-5)**

Tutoring—1-5 hours. Prerequisite: consent of instructor. Tutoring in lower division Asian American Studies courses in small group discussion. Weekly meetings with instructor. May be repeated for credit once for a given course and also for a different course. (P/NP grading only.) —F, W, S. (F, W, S.)

#### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. Primarily intended for upper division students. (P/NP grading only.) —F, W, S. (F, W, S.)

#### **198F. Student Facilitated Course (1-4)**

Student-facilitated (taught) course intended for upper division students. Offered irregularly. (P/NP grading only.)

#### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) —F, W, S. (F, W, S.)

#### **199FA. Student Facilitated Course Development (1-4)**

Under the supervision of a faculty member, an undergraduate student plans and develops the course they will offer under 98F/198F. Offered irregularly. (P/NP grading only.)

#### **199FB. Student Facilitated Teaching (1-4)**

Prerequisite: course 199FA. Student facilitated. Under the supervision of a faculty member, an undergraduate student teaches a course under 98F/198F. Offered irregularly. (P/NP grading only.)

## **Asian Studies**

**See Asian American Studies, on page 182; East Asian Languages and Cultures, on page 244; and East Asian Studies, on page 249.**

## **Astronomy**

**See Physics, on page 503.**

## **Atmospheric Science**

(College of Agricultural and Environmental Sciences)

**Faculty.** See under Department of Land, Air and Water Resources, on page 391.

#### **The Major Program**

Atmospheric science is the study of the air that surrounds the planet. It includes all weather phenomena and climate including global and regional climate change, the chemistry of trace constituents and cloud and particle formation, interactions between ecosystems and the atmosphere, as well as quantitative studies of climate extremes and severe weather, including droughts, floods, hurricanes and tornadoes. The study of the impacts of human and other biotic activity on the quality of the air we breathe are important topics in the major.

**The Program.** Modern atmospheric science is a quantitative science that is reflected in the major's curriculum. In addition to the study of daily weather events, the program deals with fundamental dynamical and physical processes that involve the general circulation of the atmosphere; turbulent mass and energy transfer at the planetary surface as well as within the free atmosphere; the transfer of solar and terrestrial radiation throughout the atmosphere; atmospheric interaction with the biosphere; climate variations; and developments in remote sensing using satellites with modern meteorological instrumentation. In addition, the program has significant expertise in the areas of air quality and its related atmospheric chemistry. As well as providing a broad background in meteorology, the major includes an informal minor area to be chosen from mathematics, computer science, environmental studies, resource management or a physical or biological science.

**Internships and Career Opportunities.** Atmospheric science students have participated in internships with the California Air Resources Board, various county Air Pollution Control Districts, the National Weather Service, and performing research. Job opportunities include: national weather services, weather forecasting for broadcast media or private forecasting firms, environmental consulting firms (such as environmental impact reports, wind farm siting), government agencies at all levels from local (air quality districts, planning departments, etc.) to state (Air Resources Board) to national (NOAA), and companies whose operations are impacted by weather (such as airlines, futures markets). About half of our graduates continue their education by seeking the M.S. or Ph.D. degree in atmospheric science or related areas.

#### **B.S. Major Requirements:**

UNITS

**Written Expression. Also counts toward College English Composition Requirement .....** 3-4

University Writing Program 101 or one course from 102 or 104 sequences or course selected with adviser's approval

**Preparatory Subject Matter .....** 59-60

Plant Sciences 2 ..... 4

Chemistry 2A, 2B ..... 10

Computer Science Engineering 30 or course selected with adviser's approval .... 4

Mathematics 21A, 21B, 21C, 21D, 22A,

22B ..... 22

Atmospheric Science 60 ..... 4

Physics 9A, 9B, 9C ..... 12

Statistics 13 ..... 3

**Depth Subject Matter.....** 41

Atmospheric Science 110, 111, 111L, 120, 121A, 121B, 124, 128 ..... 28

Internship-Atmospheric Science 192 or 199 .....	2
Two upper division Atmospheric Science courses selected with adviser's approval, not including courses 192 and 199 .....	7
Engineering 6, Atmospheric Science 150, Civil and Environmental Engineering 119A or course selected with adviser's approval .....	4
<b>Restricted Electives .....</b>	<b>15</b>
Coordinated group of courses (minor area) to be chosen with adviser's approval from mathematics, computer science, environmental studies, communication, resource management, or a physical or biological science (at least 10 upper division units).....	15

### Total Units for the Major..... 118-120

**Major Adviser.** Kyaw Tha Paw U

**Advising Center** for the major, is located in 1150 Plant and Environmental Sciences Building in Land, Air and Water Resources Teaching Center 530-752-1603 ATM Adviser Lacole Brooks; [lawradvising@ucdavis.edu](mailto:lawradvising@ucdavis.edu).

**Note.** Alternative options for students who are interested in atmospheric science are to minor in ATM or to major in ESM choosing climate change and air quality track. However, both the ATM minor and the ESM climate change and air quality track do not meet the Federal civil service requirements for meteorologists.

### Minor Program Requirements:

**Minor Program.** The minor in Atmospheric Science provides a broad treatment of weather and climate, with the option to focus on such topics as climate change, meteorological instrumentation, and satellite remote sensing. Students undertaking the minor should have completed minimum preparatory course work in calculus and physics (Mathematics 16A-16B, Physics 5A or 7A). Some upper division courses in Atmospheric Science have the Mathematics 21 and 22 series and the Physics 9 series as prerequisites.

### UNITS

<b>Atmospheric Science.....</b>	<b>20-24</b>
Atmospheric Science 60, 110.....	8
Four courses selected with the approval of the minor program adviser from upper division Atmospheric Science courses (excluding 192 or 199) or Environmental Science and Management 131 .....	12-16

**Minor Adviser.** Kyaw Tha Paw U

**Graduate Study.** You can specialize in particular areas of atmospheric science through graduate study and research leading to the M.S. and Ph.D. degrees. For details, see the [Atmospheric Science \(A Graduate Group\)](#), on page 187, and see [Graduate Studies](#), on page 120.

**Related Courses.** See Environmental Science and Policy 150A; Physics 104A, 104B; Environmental Science and Management 131.

### Courses in Atmospheric Science (ATM)

Questions pertaining to the following courses should be directed to the instructor or to the Land, Air and Water Resources Teaching Center in 1150 Plant & Environmental Sciences Building 530-752-1603.

### Lower Division

#### 5. Global Climate Change (3)

Lecture—2 hours; discussion—1 hour. Scientific concepts needed to understand climate and climate change. Principles of regional variations in climate. Understanding observed seasonal, decadal and millennial changes. Analysis of the Antarctic ozone hole, El Niño and human-induced global warming. GE credit: SciEng | QL, SE, SL, VL.—S. (S.) Ullrich

#### 6. Fundamentals of Atmospheric Pollution (3)

Lecture—3 hours. Effects of human emissions on the atmosphere: smog, ozone pollution, and ozone depletion; indoor air pollution; global warming; acid rain. Impacts of these problems on the earth, ecosystems, and humans. Strategies to reduce atmospheric pollution. GE credit: SciEng | SE, SL, VL.—F. (F.) Anastasio

#### 10. Severe and Unusual Weather (3)

Lecture—2 hours; discussion—1 hour. Prerequisite: high school physics. Introduction to physical principles of severe and unusual weather: flood, blizzards, thunderstorms, lightning, tornadoes, and hurricanes. Emphasis on scientific perspective and human context. Not open to students who have received credit for course 100. (Former course 100.) GE credit: SciEng, Wrt | QL, SE, SL, VL.—F, W. (F, W.) Chen, Grotjahn, Paw U

#### 60. Introduction to Atmospheric Science (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A or 21A and Physics 5A, 7A or 9A. Fundamental principles of the physics, chemistry, and fluid dynamics underlying weather and climate. Solar radiation, the greenhouse effect, and the thermal budget of the Earth. Clouds and their formation, convection, precipitation, mid-latitude storm systems. GE credit: SciEng | QL, SE, VL.—F. (F.) Faloona

#### 92. Atmospheric Science Internship (1-12)

Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Internship off and on campus in atmospheric science. Internship supervised by a member of the faculty. (P/NP grading only.)—F, W, S. (F, W, S.)

#### 98. Directed Group Study (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S. (F, W, S.)

#### 99. Special Study for Undergraduates (1-5) (P/NP grading only.)—F, W, S. (F, W, S.)

### Upper Division

#### 110. Weather Observation and Analysis (4)

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 60. Acquisition, distribution and analysis of meteorological data. Vertical sounding analysis, stability indices, probability of local severe weather, weather map analysis. Use of National Weather Service analyses and forecast products. Laboratory makes use of computer-generated analyses. Offered in alternate years. GE credit: SciEng | OL, QL, SE, VL.—S. Chen

#### 111. Weather Analysis and Prediction (3)

Lecture—3 hours. Prerequisite: courses 110, 121B, 111L (concurrently), knowledge of a programming language. Tools for analyzing observed properties of mid-latitude weather systems. The analysis-forecast system, including various weather forecast models. General structure and properties of mid-latitude weather systems. Offered in alternate years. GE credit: SciEng | QL, SE, VL.—W. Grotjahn

#### 111LY. Weather Analysis and Prediction Laboratory (2)

Laboratory—2 hours; web virtual lecture—4 hours. Prerequisite: course 111 (concurrently). Subjective and objective analysis of weather data. Web-based learning of the analysis-forecast system and various weather forecasting situations. Weather map interpretation and forecast discussions. (P/NP grading only.) Offered in alternate years. GE credit: SciEng | OL, QL, SE, VL.—W. Grotjahn

#### 112. Weather Forecasting Practice (2)

Discussion—2 hours; laboratory—1 hour. Prerequisite: course 110. Formal practice in preparing local weather forecasts. Analysis of current weather conditions and recent model performance. Verification and discussion of prior forecast. Interpretation of current forecast model guidance. Posting of forecast. May be repeated for credit up to three times. (P/NP grading only.)—F. (F.) Grotjahn

#### 115. Hydroclimatology (3)

Lecture—3 hours. Prerequisite: course 60. Examination of climate as the forcing function for the hydrologic system. Emphasis on seasonal variations in the relationship between precipitation and evapotranspiration for meso-scale areas. Watershed modeling of floods and drought for evaluating the effects of climatic fluctuations. Offered irregularly. GE credit: SciEng | SE, SL.—S. (S.)

#### 116. Climate Change (4)

Lecture—3 hours; extensive writing. Prerequisite: University Writing Program 1; consent of instructor. Climate trends and patterns spanning the recent past and the future. Emphasis on natural processes that produce climate variations and human influence on these processes. Evidence of climate change and the role of global climate models in understanding climate variability. Offered in alternate years. GE credit: SciEng | QL, SE, WE.—(S.) Anastasio

#### 120. Atmospheric Thermodynamics and Cloud Physics (4)

Lecture—3 hours; extensive problem solving. Prerequisite: Mathematics 21C, Physics 9B, course 60 (may be taken concurrently). Atmospheric composition and structure, thermodynamics of atmospheric gases, thermal properties of dry and moist air, atmospheric stability; cloud nucleation, cloud growth by condensation and collision, cloud models. GE credit: SciEng | QL, SE, VL.—F. (F.) Faloona

#### 121A. Atmospheric Dynamics (4)

Lecture—3 hours; extensive problem solving. Prerequisite: course 120, Mathematics 21D, Physics 9B. Fundamental forces of atmospheric flow; noninertial reference frames; development of the equations of motion for rotating stratified atmospheres; isobaric and natural coordinate systems; geostrophic flow; thermal wind; circulation and vorticity. GE credit: SciEng | QL, SE.—W. (W.) Chen, Nathan, Ulrich

#### 121B. Atmospheric Dynamics (4)

Lecture—3 hours; extensive problem solving. Prerequisite: course 121A. Dynamics of fluid motion in geophysical systems; quasi-geostrophic theory; fundamentals of wave propagation in fluids; Rossby waves; gravity waves; fundamentals of hydrodynamic instability; two-level model; baroclinic instability and cyclogenesis. GE credit: SciEng | QL, SE.—S. (S.) Chen

#### 124. Meteorological Instruments and Observations (3)

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 60; Physics 5C. Modern meteorological instruments and their use in meteorological observations and measurements. Both standard and micro-meteorological instruments are included. Offered in alternate years. GE credit: SciEng | QL, SE, SL, VL.—(F.) Paw U

#### 128. Radiation and Satellite Meteorology (4)

Laboratory/discussion—3 hours; extensive problem solving—1 hour. Prerequisite: course 60, Physics 9B, Mathematics 22B, 21D. Concepts of atmospheric radiation and the use of satellites in remote sensing. Emphasis on the modification of solar and infrared radiation by the atmosphere. Estimation from satellite data of atmospheric variables such as temperatures and cloudiness. GE credit: SciEng | QL, SE, VL.—W. (W.) Nathan

#### 133. Biometeorology (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: one course in a biological discipline and Mathematics 16B or consent of instructor. Atmospheric and biological interactions. Physical and biological basis for water vapor, carbon dioxide and energy exchanges with the atmosphere associated with plants and animals, including humans. Microclimate of plant canopies and microclimatic modification such as frost protection and windbreaks. GE credit: SciEng | QL, SE, SL, VL.—W. (W.) Paw U

#### 149. Air Pollution (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21D, 22B; C- or better in Chemistry 2B; Atmospheric Science 121A or C- or better in Engineering 103. Physical and technical aspects of

air pollution. Emphasis on geophysical processes and air pollution meteorology as well as physical and chemical properties of pollutants. (Same course as Civil and Environmental Engineering 149.) GE credit: SciEng | QL, SE, SL. —F. (F.) Cappa

### **150. Introduction to Computer Methods in Physical Sciences (4)**

Lecture—3 hour; lecture/discussion—2 hours. Prerequisite: Mathematics 22B, Physics 9B, and a computer programming course such as Engineering Computer Science 30. Additional courses in fluid dynamics (course 121A or Engineering 103) and in Fourier transforms (Mathematics 118C or Physics 104A) are helpful, but not required. Computational techniques used in physical sciences. Integral and differential equation numerical solution: mainly finite differencing and spectral (Fourier transform) methods. Time series applications (time-permitting). Specific applications drawn from meteorology.

Accelerated introduction to FORTRAN including programming assignments. Enrollment limited to 12, preference to Atmospheric Science majors. (P/NP grading only.) Offered irregularly. GE credit: SE. —F. (F.) Grotjahn

### **158. Boundary-Layer Meteorology (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 121A. Dynamics of the atmosphere nearest the Earth's surface. Friction and heat transfer. Properties of turbulent flows; statistical and spectral techniques; use and interpretation of differential equations. Emphasis on the importance to weather, air pollution, and the world's oceans. Offered in alternate years. GE credit: SciEng | QL, SE, VL. —(S.) Falloona

### **160. Introduction to Atmospheric Chemistry (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 2B. Quantitative examination of current local, regional and global problems in atmospheric chemistry (including photochemical smog, acid deposition, climate change, and stratospheric ozone depletion) using fundamental concepts from chemistry. Basic chemical modeling of atmospheric reaction systems. Offered in alternate years. GE credit: SciEng | QL, SE, SL, VL. —W. Anastasio

### **192. Atmospheric Science Internship (1-12)**

Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Internship off and on campus in atmospheric science. Internship supervised by a member of the faculty. (P/NP grading only.) —F, W, S. (F, W, S.)

### **198. Directed Group Study (1-5)**

Prerequisite: three upper division units in Atmospheric Science. (P/NP grading only.) —F, W, S. (F, W, S.)

### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: three upper division units in Atmospheric Science and at least an overall B average. (P/NP grading only.) —F, W, S. (F, W, S.)

### **Graduate**

#### **215. Advanced Hydroclimatology (3)**

Lecture—3 hours. Prerequisite: course 115. Theoretical and applied aspects of energy and mass fluxes linking the earth's surface, atmosphere, and hydrologic system. Emphasis on regional scale analysis and modeling, spatial data representation, and climate change influences on precipitation and its hydroclimatic expression. Offered irregularly.—S. (S.)

#### **221. Advanced Atmospheric Dynamics (3)**

Lecture—3 hours. Prerequisite: course 121B. Conditions for instability in stratified atmospheres; baroclinic instability; forced topographic Rossby Waves; wave-mean flow interaction theory; tropical dynamics; stratospheric dynamics. Offered in alternate years.—(W.) Nathan

### **223. Advanced Boundary-Layer Meteorology (3)**

Lecture—3 hours. Prerequisite: course 230. Characteristics of the atmospheric boundary layer under convective and nocturnal conditions. Heat budget at the surface and boundary layer forcing. Similarity theory and scaling of the boundary layer. Measurement and simulation techniques. Offered in alternate years.—(S.) Falloona

### **230. Atmospheric Turbulence (3)**

Lecture—3 hours. Prerequisite: course 121B or 158. Dynamics and energetics of turbulence in the atmosphere including vorticity dynamics. Statistical description of turbulence; Eulerian and Lagrangian scales, spectral analysis, conditional sampling techniques. Turbulent diffusion; the closure problem, gradient-diffusion and second-order methods. Offered in alternate years.—W. Paw U

### **231. Advanced Air Pollution Meteorology (3)**

Lecture—3 hours. Prerequisites: Course 149A, 160 and one course in fluid dynamics. Processes determining transport and diffusion of primary and secondary pollutants. Models of chemical transformation, of the atmospheric boundary layer and of mesoscale wind fields, as applicable to pollutant dispersion problems. Offered irregularly.—F. (F.) Paw U

### **233. Advanced Biometeorology (3)**

Lecture/discussion—3 hours. Prerequisite: course 133 or consent of instructor. Current topics in biometeorology. Physical and biological basis for water vapor, other gases, and energy exchange with the atmosphere. Topics include modeling and measuring turbulent transport from plant canopies, surface temperatures and energy budgets, bio-aerosol physics and aerobiology. Offered in alternate years.—(W.) Paw U

### **240. General Circulation of the Atmosphere (4)**

Lecture/discussion—4 hours. Prerequisite: course 121B. Large-scale, observed atmospheric properties. Radiation, momentum, and energy balances derived and compared with observations. Lectures and homework synthesize observations and theories, then apply them to understand the large-scale circulations. Offered in alternate years.—F. Grotjahn

### **241. Climate Dynamics (3)**

Lecture/discussion—3 hours. Prerequisite: course 121B. Dynamics of large-scale climatic variations over time periods from weeks to centuries. Description of the appropriate methods of analysis of atmospheric and oceanic observations. Conservation of mass, energy and momentum. Introduction to the range of climate simulations. Offered in alternate years.—(F.) Ullrich

### **245. Climate Change, Water and Society (4)**

Lecture—4 hours. Class size limited to 25 students. Integration of climate science and hydrology with policy to understand hydroclimatology and its impact upon natural and human systems. Assignments: readings, take-home examination on climate and hydrologic science, paper that integrates course concepts into a research prospectus or review article. (Same course as Hydrologic Sciences 245 and Ecology 245.) —F. (F.) Fogg, Lubell, Ullrich

### **250. Meso-Scale Meteorology (3)**

Lecture—3 hours. Prerequisite: graduate standing, course 150, a course in partial differential equations; or consent of instructor. The study of weather phenomena with horizontal spatial dimensions between 2.5 and 2500 kilometers. Methods of observational study and numerical modeling of the structure and temporal behavior of these weather systems. Offered in alternate years.—(W.) Chen

### **255. Numerical Modeling of the Atmosphere (4)**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 121B and Engineering 5; course 150 recommended. Principles of numerical modeling of the dynamic, thermodynamic and physical processes of the atmosphere. Hands-on experiments on model

development using the shallow water equations and the primitive equations. Operational forecast models. Offered in alternate years.—W. Chen

### **260. Atmospheric Chemistry (3)**

Lecture—3 hours. Prerequisite: course 160. Chemistry and photochemistry in tropospheric condensed phases (fog, cloud, and rain drops and aerosol particles). Gas-drop and gas-particle partitioning of compounds and effects of reactions in condensed phases on the fates and transformations of tropospheric chemical species. Offered in alternate years.—S. Anastasio

### **265. The Art of Climate Modeling (3)**

Lecture—2 hours; laboratory—1 hour. Prerequisite: course 121A. Over the past fifty years, global models have given us incredible insight into the Earth system. This course provides an introduction to these models, with a focus on their design and the science questions they have been built to address. Offered irregularly.—S. (S.) Ullrich

### **270A. Topics in Atmospheric Science: Meteorological Statistics (1-3)**

Discussion—1-3 hours. Prerequisite: consent or instructor. Applications and concepts in meteorological statistics.—F, W, S. (F, W, S.)

### **270B. Topics in Atmospheric Science: Computer Modeling of the Atmosphere (1-3)**

Discussion—1-3 hours. Prerequisite: consent or instructor. Applications and concepts in computer modeling of the atmosphere.—F, W, S. (F, W, S.)

### **270C. Topics in Atmospheric Science: Design of Experiments and Field Studies in Meteorology (1-3)**

Discussion—1-3 hours. Prerequisite: consent or instructor. Applications and concepts in design of experiments and field studies in meteorology.—F, W, S. (F, W, S.)

### **270D. Topics in Atmospheric Science: Solar and Infrared Radiation in the Atmosphere (1-3)**

Discussion—1-3 hours. Prerequisite: consent or instructor. Applications and concepts in solar and infrared radiation in the atmosphere.—F, W, S. (F, W, S.)

### **270E. Topics in Atmospheric Science: Aerosol and Cloud Physics (1-3)**

Discussion—1-3 hours. Prerequisite: consent or instructor. Applications and concepts in aerosol and cloud physics.—F, W, S. (F, W, S.)

### **270F. Topics in Atmospheric Science: Atmospheric Chemistry (1-3)**

Discussion—1-3 hours. Prerequisite: consent or instructor. Applications and concepts in atmospheric chemistry.—F, W, S. (F, W, S.)

### **270G. Topics in Atmospheric Science: General Meteorology (1-3)**

Discussion—1-3 hours. Prerequisite: consent or instructor. Applications and concepts in general meteorology.—F, W, S. (F, W, S.)

### **280A. Air Quality Policy in the Real World (4)**

Project. Prerequisite: consent of instructor; Atmospheric Science 149 or Engineering: Civil and Environmental 149, and Engineering: Civil and Environmental 242 or equivalent. In-depth investigation of an air quality problem with a team and mentor from government or industry. Science, engineering and policy will be involved. Findings will be presented orally and in writing. (Deferred grading only, pending completion of sequence.) Offered irregularly.—F, S. (F, S.)

### **280B. Air Quality Policy in the Real World (4)**

Project. Prerequisite: course 280A; consent of instructor. In-depth investigation of an air quality problem with a team and mentor from government or industry. Science, engineering and policy will be involved. Findings will be presented orally and in writing. (Deferred grading only, pending completion of sequence.) Offered irregularly.—F, S. (F, S.)

**290. Seminar (1)**

Seminar—1 hour. Prerequisite: graduate standing in Atmospheric Science or related field. Current developments in selected areas of atmospheric research. Topics will vary according to student and faculty interests. (S/U grading only.)—F, W, S. (F, W, S.)

**291A. Research Conference in Atmospheric Science; Air Quality Meteorology (1-3)**

Lecture/discussion—1-3 hours. Prerequisite: consent of instructor. Review and discussion of current literature and research in Air Quality Meteorology. May be repeated up to 6 units for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**291B. Research Conference in Atmospheric Science; Biometeorology (1-3)**

Lecture/discussion—1-3 hours. Prerequisite: consent of instructor. Review and discussion of current literature and research in Biometeorology. May be repeated up to 6 units for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**291C. Research Conference in Atmospheric Science; Boundary Layer Meteorology (1-3)**

Lecture/discussion—1-3 hours. Prerequisite: consent of instructor. Review and discussion of current literature and research in Boundary Layer Meteorology. May be repeated up to 6 units for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**291D. Research Conference in Atmospheric Science; Climate Change (1-3)**

Lecture/discussion—1-3 hours. Prerequisite: consent of instructor. Review and discussion of current literature and research in Climate Change. May be repeated up to 6 units for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**291E. Research Conference in Atmospheric Science; General Meteorology (1-3)**

Lecture/discussion—1-3 hours. Prerequisite: consent of instructor. Review and discussion of current literature and research in General Meteorology. May be repeated up to 6 units for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**291F. Research Conference in Atmospheric Science; Atmospheric Chemistry (1-3)**

Lecture/discussion—1-3 hours. Prerequisite: consent of instructor. Review and discussion of current literature and research in Atmospheric Chemistry. May be repeated up to 6 units for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**298. Group Study (1-5)**

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)—F, W, S. (F, W, S.)

**299. Research (1-12)**

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)—F, W, S. (F, W, S.)

**Professional****393. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

**396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## Atmospheric Science (A Graduate Group)

Ian Faloona, Ph.D., Chairperson of the Group  
530-752-2044

**Group Office.** 1152 Plant and Environmental Sciences Building 530-752-1669;  
<http://atm.ucdavis.edu>

**Faculty**

Cort Anastasio, Ph.D., Professor  
Joseph Biello, Ph.D., Associate Professor  
(Mathematics)

Christopher Cappa, Ph.D., Assistant Professor

(Civil and Environmental Engineering)

Shu-Hua Chen, Ph.D., Associate Professor

Ian Faloona, Ph.D., Associate Professor

Richard Grotjahn, Ph.D., Professor

Michael J. Kleeman, Ph.D., Professor

(Civil and Environmental Engineering)

John Largier, Ph.D., Professor

(Environmental Science and Policy)

Terrence R. Nathan, Ph.D., Professor

Kyaw Tha Paw U, Ph.D., Professor

Paul Ullrich, Ph.D., Assistant Professor

Susan Ustin, Ph.D., Professor

Anthony Wexler, Ph.D., Professor (Mechanical and Aerospace Engineering; Civil and Environmental Engineering)

Bruce White, Ph.D., Professor (Mechanical and Aerospace Engineering)

Zhang, Qi, Assistant Professor (Environmental Toxicology)

**Emeriti Faculty**

Thomas A. Cahill, Ph.D., Professor Emeritus

Robert Floccihini, Ph.D., Professor Emeritus

(Crocker Nuclear Laboratory)

Ruth Reck, Ph.D., Professor Emeritus

Bryan Ware, Ph.D., Professor Emeritus

**Affiliated Faculty**

Lowell Ashbaugh, Ph.D., Associate Researcher

Emeritus (Crocker Nuclear Laboratory)

Steven S. Cliff, Ph.D., Assistant Researcher

(Applied Science)

Ann Dillner, Ph.D., Assistant Researcher

(Crocker Nuclear laboratory)

Richard L. Snyder, Ph.D., Biometeorology Specialist

Richard Anthony VanCuren, Ph.D., Professional Researcher (Air Pollution Research Center)

**Graduate Study.** The Graduate Group in Atmospheric Science offers both the M.S. and Ph.D. degree programs. A student may place emphasis on graduate work in one or more of the following fields: air quality meteorology, atmospheric chemistry, biometeorology, micrometeorology, numerical weather prediction, remote sensing, climate dynamics, large scale dynamics, and meso-scale meteorology. The diverse and extensive backgrounds of the faculty allow opportunities for interdisciplinary training and research.

**Preparation.** The Group encourages applications from all interested students with backgrounds in the physical or natural sciences. Basic qualifications for students entering the Atmospheric Science graduate program include mathematics to the level of vector calculus and differential equations, and one year of college-level physics. Flexibility may be allowed for students with high academic potential, but it is expected that deficiencies in preparatory material and in key undergraduate atmospheric science courses be completed within the first year of graduate study.

**Graduate Adviser.** Terrence Nathan, Ph.D.

**Graduate Admissions Officer.** Christopher Cappa, Ph.D.

## Avian Sciences

This major has been discontinued as of Fall 2011; see [Animal Science, on page 162](#).

(College of Agricultural and Environmental Sciences)

**Faculty.** See under [Animal Science, on page 162](#).

**Advising Center** for the minor and course offerings is located in the Animal Science Advising Center in 1202 Meyer Hall 530-754-7915; <http://asac.ucdavis.edu/>

**The Program.** The flexibility of the program and the close personal interaction between students, faculty, and specialists in the field give students a large role in selecting and designing their own course work.

**Internships and Career Alternatives.** Independent study, undergraduate research, and internships are emphasized in the Avian Sciences program. Birds for laboratory or special study are housed within the main building as well as at the research farm and the experimental aviary.

**Minor Program Requirements:**

UNITS

**Avian Sciences ..... 18**

Choose one from: Avian Sciences 11, 13, 14L, 15L, 16L ..... 2-3

Choose remaining units from: Avian Sciences 100, 103, 115, 121, 123, 149, 150, 160; Animal Science 143; Neurobiology, Physiology, and Behavior 117; Wildlife, Fish, and Conservation Biology 111, 136 ..... 15-16

**Graduate Study.** The Avian Sciences Graduate Group offers a program of study and research leading to the M.S. degree in Avian Sciences. The M.S. degree is offered in Avian Sciences. For details, see [Graduate Studies, on page 120](#).

**Related Courses.** See Agricultural and Resource Economics 130; Animal Science 143; Food Science and Technology 120, 120L, 121; Molecular and Cellular Biology 150, 150L; Nutrition 123, 123L.

**Courses in Avian Sciences (AVS)****Lower Division****11. Introduction to Poultry Science (3)**

Lecture—3 hours. The mosaic of events that have tied poultry science to other scientific disciplines and poultry to humans. Poultry science techniques and production methods from the time of domestication to the present. One field trip required. GE credit: SciEng, Wrt | SE.

**13. Birds, Humans and the Environment (3)**  
Lecture—2 hours; discussion—1 hour. Interrelationships of the worlds of birds and humans. Lectures, discussions, field trips and projects focus on ecology, avian evolution, physiology, reproduction, flight, behavior, folklore, identification, ecotoxicology and conservation. Current environmental issues are emphasized. Half-day field trip. GE credit: SciEng, Wrt | SE, SL.—F. (F.) King

**14L. Management of Captive Birds (2)**

Fieldwork—3 hours; lecture/discussion—1 hour. Prerequisite: consent of instructor. One weekly discussion and field trip to study practical captive management (housing, feeding, equipment, marketing, diseases). Visit facilities rearing birds such as commercial parrots, hobbyist exotics, ostrich, raptors, waterfowl, game birds, poultry and pigeons. GE credit: SciEng | SE.

**15L. Captive Raptor Management (2)**

Laboratory—3 hours; independent study—3 hours; one field trip. Hands-on experience handling birds of prey. Students are taught all of the skills required to handle and care for raptors, including their husbandry, biology, habitat requirements, cage design, veterinary care, rehabilitation methods, research potential and long-term care requirements. GE credit: SciEng | SE.

**16LA. Raptor Migration and Population Fluctuations (2)**

Fieldwork—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Identify raptors: study of effects of weather, crops, agricultural practices on fluctuations in raptor species and numbers. Familiarize with literature; design a project; survey study sites; collect, computerize, analyze data, compare with previous years. Species, observations, emphasis different each quarter. One Saturday field trip. GE credit: SciEng | SE.

**16LB. Raptor Migration and Population Fluctuations (2)**

Fieldwork—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Identify raptors: study of effects of weather, crops, agricultural practices on fluctuations in raptor species and numbers. Familiarize with literature; design a project; survey study

sites; collect, computerize, analyze data, compare with previous years. Species, observations, emphasis different each quarter. One Saturday field trip. GE credit: SciEng | SE.

### **16LC. Raptor Migration and Population Fluctuations (2)**

Fieldwork—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Identify raptors: study of effects of weather, crops, agricultural practices on fluctuations in raptor species and numbers. Familiarize with literature; design a project; survey study sites; collect, computerize, analyze data, compare with previous years. Species, observations, emphasis different each quarter. One Saturday field trip. GE credit: SciEng | SE.

### **92. Internship in the Avian Sciences (1-12)**

Internship—3-36 hours. Prerequisite: sophomore standing preferred; consent of instructor. Internship on and off campus in poultry, game birds or exotic bird production, management and research; or in a business, industry, or agency concerned with these entities. Compliance with Internship Approval form essential. (P/NP grading only.)

### **98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

### **99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

## **Upper Division**

### **100. Avian Biology (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 2A, 2B, Animal Science 2 preferred. Biology of domesticated poultry, specifically chickens and turkeys. Avian genetics, immunology, reproduction, growth and development, broiler and layer management. GE credit: SciEng | SE.—S. (S.) Zhou

### **103. Avian Development and Genomics (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 2A, 2B. Unique features of avian development and genomics: Incubation; Staging; Egg Structure/Function; Fertilization; Pre-oviposital; Oviposition; Cold Torpor; Post-oviposital Development; Organogenesis; Growth; Sexual Differentiation; Extraembryonic Membranes; Mortality/Hatching; Genome Organization; Comparative Avian Genomics; Telomere Biology; Sex Chromosomes/Sex Determination; Advanced Technologies; Genome Manipulation; Mutations. GE credit: SciEng | SE.—F. (F.) Delany

### **115. Raptor Biology (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 2A or the equivalent. Study of birds of prey: classification, distribution, habits and habitats, migration, unique anatomical and physiological adaptations, natural and captive breeding, health and diseases, environmental concerns, conservation, legal considerations, rehabilitation, and falconry. Includes two Saturday field trips. Offered irregularly. GE credit: SciEng | SE.—Su. (Su.)

### **121. Avian Reproduction (2)**

Lecture—2 hours. Prerequisite: Biological Sciences 2A, 2B. Breeding cycles and reproductive strategies, egg and sperm formation, incubation, sexual development, imprinting, hormonal control of reproductive behavior and song. Species coverage includes wild and companion birds. Course has a physiological orientation. GE credit: SciEng | SE, SL.

### **123. Management of Birds (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 2A, 2B. Captive propagation of birds, including reproduction, genetic management, health, feeding, artificial incubation, artificial insemination, and related legal aspects, including trade and smuggling. Emphasis on exotic species and the role of captive propagation in conservation. GE credit: SciEng | SE, SL, WE.

### **149. Egg Production Management (2)**

Lecture—2 hours. Prerequisite: course 11 or consent of instructor. Management of commercial table egg flocks as related to environment, nutrition, disease

control, economics, housing, equipment, egg processing and raising replacement pullets. One Saturday field trip required. GE credit: SciEng | SE.

### **150. Nutrition of Birds (1)**

Lecture—1 hour. Prerequisite: Animal Biology 103 or Biological Sciences 103 (may be taken concurrently). Principles of nutrition specific to avian species, including feedstuffs, feed additives, nutrient metabolism, energy systems, and nutritional support of egg production and growth. Use of computers for feed formulation to support production. GE credit: QL, SciEng | SE.—Klasing

### **160. Designing and Performing Experiments in Avian Sciences (2)**

Laboratory—6 hours. Prerequisite: course 100 or Wildlife, Fish, and Conservation Biology 111 or consent of instructor. Experiments in current problems in avian biology. Introduction to experimental design. Students choose a project, design a protocol, perform an experiment and report their findings. May be repeated for credit with consent of instructor. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

### **170. Advanced Avian Biology (4)**

Lecture/discussion—3 hours; project—1 hour. Prerequisite: course 100 or Wildlife, Fish, and Conservation Biology 111. Ecology, behavior, functional morphology and life-history evolution of birds. Emphasis on the importance of body size as a principle determinant of most aspects of avian performance from lifespan to reproduction and species abundance. Analytical synthesis and critical thought emphasized. GE credit: SciEng | SE.

### **190. Seminar in Avian Sciences (1)**

Seminar—1 hour. Prerequisite: consent of instructor. May be repeated three times for credit. (P/NP grading only.)—S. (S.) Klasing

### **192. Internship in Avian Sciences (1-12)**

Internship—3-36 hours. Prerequisite: consent of instructor. Internship on and off campus in poultry, game birds or exotic bird production, management and research; or in a business, industry, or agency concerned with these entities. Compliance with Internship Approval form essential. (P/NP grading only.)

### **195. Topics in Current Research (1-3)**

Lecture/discussion—1-3 hours. Prerequisite: consent of instructor. Discussion of topics of current interest in avian sciences. May be repeated three times for credit.—F, W, S. (F, W, S.)

### **197T. Tutoring in Avian Sciences (1-3)**

Tutorial—1-3 hours. Prerequisite: consent of instructor. Tutoring of students in lower division avian sciences courses; weekly conference with instructors in charge of courses; written critiques of teaching procedures. (P/NP grading only.)

### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

## **Graduate**

### **203. Advanced Avian Development and Genomics (1)**

Discussion—1 hour. Prerequisite: graduate standing; concurrent enrollment in course 103. In consultation with the instructor, students develop a lecture and associated instructional materials, i.e., lesson plan, including justification, reading and presentation and evaluation aids. The topic must complement a topic covered in Avian Sciences 103. Offered irregularly.—F. (F.) Delany

### **290. Seminar (1)**

Seminar—1 hour. Reports and discussions of recent advances and selected topics of current interest in avian genetics, physiology, nutrition, and poultry technology.—F. (F.) Klasing

### **290C. Research Conference (1)**

Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Major professors lead research discussions with their graduate students. Research papers are reviewed and project proposals presented and evaluated. Format will combine seminar and discussion. (S/U grading only.)—F, W, S. (F, W, S.)

### **297T. Supervised Teaching in Avian Sciences (1-4)**

Tutoring—1-4 hours. Prerequisite: graduate standing and consent of instructor. Tutoring of students in lower, upper division, and graduate courses in Avian Sciences; weekly conference with instructor in charge of course; written critiques of teaching methods in lectures and laboratories. (S/U grading only.)—F, W, S. (F, W, S.)

### **298. Group Study (1-5)**

Prerequisite: consent of instructor.

### **299. Research (1-12)**

Prerequisite: consent of instructor. (S/U grading only.)

## **Avian Sciences (A Graduate Group)**

Kirk Klasing, Ph.D., Chairperson of the Group

**Group Office.** 1249 Meyer Hall  
530-752-2382; <http://aviansciences.ucdavis.edu>

## **Faculty**

Richard Blatchford, Ph.D., Assistant Poultry Extension Specialist (*Animal Science*)

C. Christopher Calvert, Ph.D., Professor (*Animal Science*)

Thomas P. Coombs-Hahn, Ph.D., Associate Professor (*Neurobiology, Physiology, and Behavior*)

Mary E. Delany, Ph.D., Professor (*Animal Science*)

John M. Eadie, Ph.D., Professor (*Wildlife, Fish, and Conservation Biology, Animal Science*)

Michelle Hawkins, V.M.D., ABVP, Associate Professor (*Medicine and Epidemiology, School of Veterinary Medicine*)

Joshua M. Hull, Ph.D., Assistant Adjunct Professor (*Animal Science*)

Annie J. King, Ph.D., Professor (*Animal Science*)

Kirk C. Klasing, Ph.D., Professor (*Animal Science*)

Maja M. Makagon, Ph.D., Assistant Professor (*Animal Science*)

Joy A. Mench, Ph.D., Professor (*Animal Science*)

James R. Millam, Ph.D., Professor (*Animal Science*)

Gabrielle Nevitt, Ph.D., Professor

(*Neurobiology, Physiology, and Behavior*)  
Joanne R. Paul-Murphy, D.V.M., Ph.D., Professor (*Medicine & Epidemiology; School of Veterinary Medicine*)

Maurice E. Pitesky, D.V.M., M.P.V.M., Dipl ACVPM, Assistant Specialist in Cooperative Extension (*Population Health & Reproduction; School of Veterinary Medicine*)

Lisa A. Tell, D.V.M., Professor (*Medicine and Epidemiology, School of Veterinary Medicine*)

Huaijun Zhou, Ph.D., Associate Professor (*Animal Science*)

## **Emeriti Faculty**

Hans Abplanalp, Ph.D., Professor Emeritus

Dan Anderson, Ph.D., Professor Emeritus

Francine A. Bradley, Ph.D., Specialist Emeritus

Ralph A. Ernst, Ph.D., Specialist Emeritus

Peter Marler, Ph.D., Professor Emeritus

Barry W. Wilson, Ph.D., Professor Emeritus

## **Affiliated Faculty**

Lowell Ashbaugh, Ph.D., Associate Researcher Emeritus (*Crocker Nuclear Laboratory*)

Steven S. Cliff, Ph.D., Assistant Researcher (*Applied Science*)

Ann Dillner, Ph.D., Assistant Researcher

(*Crocker Nuclear laboratory*)

Richard L. Snyder, Ph.D., Biometeorology Specialist

Richard Anthony VanCuren, Ph.D., Professional Researcher (*Air Pollution Research Center*)

**Graduate Study.** The Graduate Group in Avian Sciences offers the M.S. degree program to students who wish to pursue specialized advanced work on avian species. Specializations students may choose include behavior, nutrition, physiology, reproduction, pathology, immunology, toxicology, food chemistry, management, ecology, genetics, comparative incubation, environmental physiology, and cellular and developmental studies using wild and domestic birds as experimental animals. Both master's degree plans, thesis or comprehensive examination, are available.

**Preparation.** Applicants should have undergraduate preparation in a field appropriate to the course of study selected, including courses in most of the following subjects: general biology, general and organic chemistry, biochemistry, avian biology, genetics, nutrition, physiology, and statistics.

**Graduate Advisers.** C.C. Calvert, J.M. Eadie, K.C. Klasing.

## Biochemistry and Molecular Biology

See **Biochemistry, Molecular, Cellular and Developmental Biology**, on page 189; **Molecular and Cellular Biology**, on page 463

## Biochemistry and Molecular Biology (A Graduate Group)

The Biochemistry and Molecular Biology program has merged with the Cell and Developmental Biology program to form Biochemistry, Molecular, Cellular, and Developmental Biology (BMCDB); see **Biochemistry, Molecular, Cellular and Developmental Biology**, on page 189.

**Group Office.** 227B Life Sciences  
530-752-9091;  
<http://biosci3.ucdavis.edu/GradGroups/BMCDB/>

## Biological Chemistry

See **Medicine, School of**, on page 427.

## Biochemistry, Molecular, Cellular and Developmental Biology

Daniel Starr, Ph.D., Chairperson of the Group  
530-754-6083

**Group Office.** 227B Life Sciences  
530-752-9091;  
<http://biosci3.ucdavis.edu/GradGroups/BMCDB/>

### Faculty

Iannis, Adamopoulos, Ph.D., Associate Professor (*Medical Division of Internal Medicine, Rheumatology*)  
Jawdat Al-Bassam, Ph.D., Assistant Professor (*Molecular and Cellular Biology*)  
John, Albeck, Ph.D., Assistant Professor (*Molecular and Cellular Biology*)  
F. Javier Arsuaga, Ph.D., Professor (*Mathematics, Molecular and Cellular Biology*)

- Shota Atsumi, Ph.D., Associate Professor (*Chemistry*)  
Enoch Baldwin, Ph.D., Associate Professor (*Molecular and Cellular Biology*)  
Jacqueline Barlow, Ph.D., Professor (*Microbiology and Molecular Genetics*)  
Peter Barry, Ph.D., Professor (*Pathology*)  
Andreas Baumler, Ph.D., Professor (*Medical Microbiology and Immunology*)  
Peter A Beal, Ph.D., Professor (*Chemistry*)  
Alan Bennett, Ph.D., Professor (*Plant Sciences*)  
Donald M. Bers, Ph.D., Professor (*Pharmacology*)  
Charles Bevins, Ph.D., Professor (*Medical Microbiology and Immunology*)  
Linda F. Bisson, Ph.D., Professor (*Viticulture and Enology*)  
Eduardo Blumwald, Ph.D., Professor (*Plant Sciences*)  
Laura Borodinsky, Ph.D., Assistant Professor (*Physiology and Membrane Biology*)  
Alexander Borowsky, Ph.D., Associate Professor (*Pathology*)  
Siobhan Mary, Brady, Ph.D., Associate Professor (*Plant Biology*)  
Nadean L. Brown, Ph.D., Associate Professor (*Cell Biology and Human Anatomy*)  
Sean Burgess, Ph.D., Professor (*Molecular and Cellular Biology*)  
Marie E. Burns, Ph.D., Professor (*Cell Biology and Human Anatomy*)  
Judy Callis, Ph.D., Professor (*Molecular and Cellular Biology*) Academic Senate Distinguished Teaching Award  
Kermi L. Carraway, Ph.D., Professor (*Cancer Center UCDMC*)  
Luis G. Carvajal-Carmona, Ph.D., Assistant Professor (*Biochemistry and Molecular Medicine*)  
Frederic Chedin, Ph.D., Associate Professor (*Molecular and Cellular Biology*)  
Hongwu Chen, Ph.D., Professor (*Biochemistry and Molecular Medicine*)  
Tsung-Yu Chen Ph.D., Professor (*Neurology*)  
Xinbin Chen, Ph.D., Professor and Director (*VM: Surgical and Radiological Science*)  
Hwai-Jong Cheng, Ph.D., Professor (*Neurobiology, Physiology, and Behavior, Pathology*)  
Joanna Chiu, Ph.D., Assistant Professor (*Entomology*)  
Sean Collins, Ph.D., Assistant Professor (*Microbiology and Molecular Genetics*)  
Gino A. Cortopassi, Ph.D., Professor (*VM: Molecular Biosciences*)  
Sheila David, Ph.D., Professor (*Chemistry*)  
Scott Dawson, Ph.D., Associate Professor (*Microbiology and Molecular Genetics*)  
Michael S. Denison, Ph.D., Professor (*Environmental Toxicology*)  
Megan Dennis, Ph.D., Assistant Professor (*Biochemistry and Molecular Medicine*)  
Elva Diaz, Ph.D., Associate Professor (*Medical Pharmacology and Toxicology*)  
Savithramma P, Dinesh-Kumar, Ph.D., Professor (*Plant Biology*)  
Georgia Drakakaki, Ph.D., Assistant Professor (*Pant Science*)  
Bruce Draper, Ph.D., Associate Professor (*Molecular and Cellular Biology*)  
JoAnne Engebrecht, Ph.D., Professor (*Molecular and Cellular Biology*)  
Marc Facciotti, Ph.D., Assistant Professor (*Biomedical Engineering*)  
Robert H. Fairclough, Ph.D., Associate Professor (*Neurology*)  
Michael Ferns, Ph.D., Professor (*Physiology and Membrane Biology, Anesthesiology and Pain Medicine*)  
Oliver Fiehn, Ph.D., Professor (*Molecular and Cellular Biology*)  
Diasynou Fioravante, Ph.D., Assistant Professor (*Neurobiology, Physiology, and Behavior*)  
Andrew Fisher, Ph.D., Professor (*Chemistry, Molecular and Cellular Biology*)  
Paul G. Fitzgerald, Ph.D., Professor (*Cell Biology and Human Anatomy*)  
Annaliese K. Franz, Ph.D., Associate Professor (*Chemistry*)  
Christopher Fraser, Ph.D., Assistant Professor (*Molecular and Cellular Biology*)
- J. David Furlow, Ph.D., Professor (*Neurobiology, Physiology, and Behavior*)  
Charles S. Gasser, Ph.D., Professor (*Molecular and Cellular Biology*)  
Angela Gelli, Ph.D., Associate Professor (*Medical Pharmacology and Toxicology*)  
Damian C. Genetos, Ph.D., Assistant Professor (*VM: Anatomy and Cell Biology*)  
Paramita Ghosh, Ph.D., Associate Professor (*Urology, Biochemistry and Molecular Medicine*)  
Cecilia Giulivi, Ph.D., Professor (*VM: Molecular Biosciences*)  
Thomas M. Glaser, Ph.D., Professor (*Cell Biology and Human Anatomy*)  
Aldrin Gomes, Ph.D., Assistant Professor (*Neurobiology, Physiology and Behavior, Physiology and Membrane Biology*)  
Qizhi Gong, Ph.D., Assistant Professor (*Cell Biology and Human Anatomy*)  
John Gray, Ph.D., Assistant Professor (*Neurology*)  
Paul Hagerman, Ph.D., Professor (*Biochemistry and Molecular Medicine*)  
Nobuko Hagiwara, Ph.D., Associate Professor (*Internal Medicine: Cardiovascular Medicine*)  
Fawaz Haj, Ph.D., Professor (*Nutrition*)  
Bruce D. Hammock, Ph.D., Professor (*Entomology and Nematology*) Academic Senate Distinguished Teaching Award  
John H. Harada, Ph.D., Professor (*Plant Biology*) Academic Senate Distinguished Teaching Award  
Dominik Haudenschild, Ph.D., Associate Professor (*Orthopedics, Biomedical Engineering*)  
Johannes W. Hell, Ph.D., Professor (*Pharmacology*)  
Wolf-Dietrich Heyer, Ph.D., Professor (*Microbiology and Molecular Genetics*)  
Henry Ho, Ph.D., Assistant Professor (*Cell Biology and Human Anatomy*)  
Mary Horne, Ph.D., Assistant Adjunct Professor (*Pharmacology*)  
Mark Huising, Ph.D., Assistant Professor (*Neurobiology, Physiology and Behavior, Physiology and Membrane Biology*)  
Neil Hunter, Ph.D., Professor (*Microbiology and Molecular Genetics, Cell Biology and Human Anatomy*)  
Kentaro Inoue, Ph.D., Professor (*Plant Sciences*)  
Yoshihiro Izumiya, Ph.D., Assistant Professor (*Dermatology*)  
Li-En Jao, Ph.D., Assistant Professor (*Cell Biology and Human Anatomy*)  
Celina Juliano, Ph.D., Assistant Professor (*Molecular and Cellular Biology*)  
Ken Kaplan, Ph.D., Professor (*Molecular and Cellular Biology*)  
Jinoh Kim, Ph.D., Associate Professor (*Pediatrics*)  
Paul Knoepfler, Ph.D., Associate Professor (*Cell Biology and Human Anatomy*)  
Anne Knowlton, Ph.D., Professor (*Cardiovascular Physiology, Pharmacology*)  
Artyom Kopp, Ph.D., Professor (*Population Biology, Evolution and Ecology*)  
Ian Korff, Ph.D., Professor (*Molecular and Cellular Biology*)  
Stephen C. Kowalczykowski, Ph.D., Distinguished Professor (*Microbiology and Molecular Genetics*)  
Anna La Torre, Ph.D., Assistant Professor (*Cell Biology and Human Anatomy*)  
J. Clark Lagarias, Ph.D., Distinguished Professor (*Molecular and Cellular Biology*)  
Janine LaSalle, Ph.D., Professor (*Microbiology*)  
Jerold A. Last, Ph.D., Professor (*Pulmonary Medicine*)  
Walter Leal, Ph.D., Professor (*Molecular and Cellular Biology*)  
Julie A. Leary, Ph.D., Professor (*Molecular and Cellular Biology, Chemistry*)  
Jian-Jian Li, Ph.D., Professor (*Radiation Oncology*)  
Su-Ju Lin, Ph.D., Professor (*Microbiology and Molecular Genetics*)  
Yu-Fung Lin, Ph.D., Associate Professor (*Physiology and Membrane Biology, Anesthesiology and Pain Medicine*)  
Bo Liu, Ph.D., Professor (*Plant Biology*)  
Su Hao Lo, Ph.D., Professor (*Biochemistry and Molecular Medicine*)

Fall 2011 and on Revised General Education (GE): AH=Arts and Humanities; SE=Science and Engineering; SS=Social Sciences;

ACGH=American Cultures; DD=Domestic Diversity; OL=Oral Skills; QL=Quantitative; SL=Scientific; VL=Visual; WC=World Cultures; WE=Writing Experience

Pre-Fall 2011 General Education (GE): ArtHum=Arts and Humanities; SciEng=Science and Engineering; SocSci=Social Sciences; Div=Domestic Diversity; Wrt=Writing Experience  
Quarter Offered: F=Fall, W=Winter, S=Spring, Su=Summer; 2017-2018 offering in parentheses

Susan E. Lott, Ph.D., Assistant Professor  
*(Population Biology, Evolution and Ecology)*  
 Shirley Luckhart, Ph.D., Professor  
*(Microbiology and Immunology)*  
 Veronica Martinez-Cerdeno, Ph.D., Assistant Professor  
*(Pathology)*  
 A. Kimberley McAllister, Ph.D., Professor  
*(Neurobiology, Physiology and Behavior)*  
 Richard J. McKenney, Ph.D., Assistant Professor  
*(Molecular and Cellular Biology)*  
 Francis J. McNally, Ph.D., Professor  
*(Molecular and Cellular Biology)*  
 Maria Mudryj, Ph.D., Professor  
*(Microbiology and Immunology)*  
 Lorena Navarro, Ph.D., Assistant Professor  
*(Microbiology and Molecular Genetics)*  
 Jan Nolta, Ph.D., Professor  
*(Hematology, Oncology)*  
 Alex Nord, Ph.D., Assistant Professor  
*(Neurobiology, Physiology and Behavior)*  
 Jodi M. Nunnari, Ph.D., Professor  
*(Molecular and Cellular Biology)*  
 Martha E. O'Donnell, Ph.D., Professor  
*(Physiology and Membrane Biology)*  
 Cassandra Ori-Mckenney, Ph.D., Professor  
*(Molecular and Cellular Biology)*  
 Rebecca Parales, Ph.D., Professor  
*(Microbiology and Molecular Genetics)*  
 John A. Payne, Ph.D., Professor  
*(Physiology and Membrane Biology)*  
 David Pleasure, Ph.D., Distinguished Professor  
*(Neurology)*  
 Ted Powers, Ph.D., Professor  
*(Molecular and Cellular Biology)*  
 Martin L. Privalsky, Ph.D., Professor  
*(Microbiology and Molecular Genetics)*  
 Katherine Ralston, Ph.D., Assistant Professor  
*(Microbiology and Molecular Genetics)*  
 Robert H. Rice, Ph.D., Professor  
*(Environmental Toxicology)*  
 Alan B. Rose, Ph.D., Project Scientist  
*(Molecular and Cellular Biology)*  
 Leslie Rose, Ph.D., Professor  
*(Molecular and Cellular Biology)*  
 Jon Sack, Ph.D., Assistant Professor  
*(Anesthesiology and Pain Medicine, Physiology and Membrane Biology)*  
 Jonathan M. Scholey, Ph.D., Distinguished Professor Emeritus  
*(Molecular and Cellular Biology)*  
 David Segal, Ph.D., Professor  
*(Biochemistry and Molecular Medicine)*  
 Jared Shaw, Ph.D., Associate Professor  
*(Chemistry)*  
 Sergi Simo, Ph.D., Assistant Professor  
*(Cell Biology and Human Anatomy)*  
 Mitchell Singer, Ph.D., Professor  
*(Microbiology and Molecular Genetics)*  
 Dan Starr, Ph.D., Professor  
*(Molecular and Cellular Biology)*  
 Danielle S. Stolzenberg, Ph.D., Assistant Professor  
*(Psychology)*  
 Colleen Sweeney, Ph.D., Professor  
*(Biochemistry and Molecular Medicine)*  
 Yoshikazu Takada, Ph.D., Professor  
*(Dermatology)*  
 Cheemeng Tan, Ph.D., Assistant Professor  
*(Biomedical Engineering)*  
 Alice Tarantal, Ph.D., Professor  
*(Cell Biology and Human Anatomy)*  
 Steven M. Theg, Ph.D., Professor  
*(Plant Biology)*  
 Li Tian, Ph.D., Assistant Professor  
*(Plant Sciences)*  
 Lin Tian, Ph.D., Assistant Professor  
*(Neurobiology, Physiology, and Behavior, Physiology and Membrane Biology)*  
 Jim Trimmer, Ph.D., Professor  
*(Neurobiology, Physiology, and Behavior)*  
 Richard P. Tucker, Ph.D., Professor  
*(Cell Biology and Human Anatomy)*  
 Andrew T. Vaughan, Ph.D., Professor  
*(Radiation Oncology)*  
 John V. Voss, Ph.D., Professor  
*(Biochemistry and Molecular Medicine)*  
 Yu-Jui Yvonne Wan, Ph.D., Professor  
*(Pathology)*  
 David Wilson, Ph.D., Professor  
*(Molecular and Cellular Biology)*  
 Kevin Yang, Xiang, Ph.D., Professor  
*(Pharmacology)*  
 Lifeng Xu, Ph.D., Assistant Professor  
*(Microbiology and Molecular Genetics)*

Soichiro Yamada, Ph.D., Associate Professor  
*(Biomedical Engineering)*  
 Wei Yao, Ph.D., Associate Adjunct Professor  
*(Medical Science)*  
 Aiming Yu, Ph.D., Associate Professor  
*(Biochemistry and Molecular Medicine)*  
 Konstantinos Zarbalis, Ph.D., Assistant Professor  
*(Pathology)*  
 Philipp Zerbe, Ph.D., Assistant Professor  
*(Plant Biology)*  
 Min Zhao, Ph.D., Professor  
*(Dermatology, Ophthalmology)*  
 Chengji Zhou, Ph.D., Associate Professor  
*(Biochemistry and Molecular Medicine)*  
 Karen Zito, Ph.D., Associate Professor  
*(Neurobiology, Physiology, and Behavior)*  
**Graduate Study.** The Graduate Group in Biochemistry, Molecular, Cellular, and Developmental Biology offers programs of study and research leading to the M.S. and Ph.D. degrees. While an M.S. may be obtained while pursuing a Ph.D. only Ph.D. applications will be accepted. Biochemistry, Molecular, Cellular, and Developmental Biology is a broad interdepartmental program.  
**Preparation.** Appropriate preparation is an undergraduate degree in a biological or physical science. Preparation should include a year of calculus, physics, general chemistry and organic chemistry, and courses in statistics, biochemistry, genetics and cell biology.  
**Graduate Advisers.** F. McNally (*Molecular and Cellular Biology*), E. Diaz (*Pharmacology*), R. Tucker (*Med: Cell Biology*), R. Fairclough (*Neurology*), T. Powers (*Molecular and Cellular Biology*), L. Rose (*Molecular and Cellular Biology*), J. Engebrecht (*Molecular and Cellular Biology*), C. Fraser (*Molecular and Cellular Biology*), E. Baldwin (*Molecular and Cellular Biology*), P. Knoepfle (*Med: Cell Biology*), K. Carraway (*Med: Biochem and Molecular Medicine*), K. Zito (*Center for Neuroscience*), D. Genetos (*Vet. Anatomy & Cell Biology*), M. Singer (*Microbiology and Molecular Genetics*), B. Draper (*Molecular and Cellular Biology*)

## Courses in Biochemistry, Molecular, Cellular and Developmental Biology (BCB)

### Graduate

**210. Molecular Genetics and Genomics (3)**  
 Lecture/discussion—3 hours. Prerequisite: Biological Sciences 101 and Molecular & Cellular Biology 121, or equivalent. Pass One restricted to graduate students. Emphasizes molecular genetic and genomic approaches to address fundamental biological questions. Introduces and emphasizes the strengths of prokaryotic and eukaryotic model systems and serves as building block for the BMCDB core courses, which use model systems to develop their themes.—F. (F.) Engebrecht

### 211. Macromolecular Structure and Interactions (3)

Lecture—3 hours. Prerequisite: Biological Sciences 102, or the equivalent, or consent of instructor. Pass One restricted to graduate students. Conceptual and quantitative basis for macromolecular structure-function relationships. Investigation of the paradigm form follows function. Review of key elements of protein, nucleic acid, and membrane structure. Exploration of specific macromolecular associations by analyzing chemical structure and physical-chemical behavior. No credit for students that have taken course 221A.—F. (F.) Baldwin, Segal, Wilson

### 212. Cell Biology (3)

Lecture—3 hours. Prerequisite: Biological Sciences 104, or equivalent, or consent of instructor. Pass One restricted to graduate students. Analysis of basic processes governing cell organization, division, and transport. Study of the integration and regulation of cell behavior in response to changes in cellular environment. No credit for students that have taken course 221D.—W. (W.) Al-Bassam, Kim, McNally, Powers

### 213. Developmental Biology (3)

Lecture—3 hours. Prerequisite: undergraduate biology course or consent of instructor. Pass One restricted to graduate students. Fundamental principles in embryonic development that guide application of modern cellular and genetic approaches to understand developmental mechanisms. Emphasis on experimental approaches used to critically address scientific questions.—W. (W.) Brady, Draper, Lott, Tucker

### 214. Molecular Biology (3)

Lecture—3 hours. Prerequisite: course 211, or equivalent, or consent of instructor. Pass One restricted to graduate students. Investigation of the basic cellular processes in prokaryotes and eukaryotes that govern the central dogma of molecular biology (DNA-RNA-protein). No credit for students that have taken course 221C.—S. (S.) Chedin, Fraser, Heyer

### 215. Graduate Reading Course (2)

Discussion—10 hours. Prerequisite: graduate standing or consent of instructor. Restricted to graduate students. Development of critical reading skills through study of major paradigm advances in specialized fields of biochemistry, molecular, cell, and developmental biology. Emphasis on active learning and student participation. Guided analysis of literature and major advances in field of study. May be repeated two times for credit when topic differs.—S. (S.) Chen, Fairclough, Genetos, Giulivi, Inoue, Vaughan

### 220L. Advanced Biochemistry Laboratory Rotations (5)

Laboratory—15 hours. Prerequisite: course 210 and 211 (may be taken concurrently) and 120L or the equivalent. Open to graduate students. Two five-week assignments in BMCDB research laboratories. Individual research problems with emphasis on methodological/procedural experience, experimental design, proposal writing and oral communication of results. May be repeated two times for credit.—F. W. (F. S.) Albeck, Baldwin, Haudenschild, Tian

### 251. Molecular Mechanisms in Early Development (3)

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; introductory background in developmental biology and/or cell biology recommended. Analysis of the early events of development including: germ cells and other stem cells, gametogenesis, meiosis, imprinting, fertilization, genetically-engineered organisms, egg activation and establishment of embryonic polarity with focus on cellular events including gene regulation and cell signaling. Offered in alternate years.—(F.) Draper

### 255. Molecular Mechanisms in Pattern Formation and Development (3)

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; introductory background in developmental biology and/or genetics recommended. Genetic and molecular analysis of mechanisms that control animal development after fertilization. Establishment of embryonic axes, cell fate and embryonic pattern; induction, apoptosis, tissue patterning. Critical reading of current literature in *C.elegans*, *Drosophila*, and mouse genetic model systems. Offered in alternate years.—F. Natzle, Rose

### 257. Cell Proliferation and Cancer Genes (3)

Lecture—1.5 hours; seminar—1.5 hours. Prerequisite: course 221C and 221D or equivalents. Genetic and molecular alterations underlying the conversion of normal cells to cancers, emphasizing regulatory mechanisms and pathways. Critical reading of the current literature and development of experimental approaches.—F. (F.) Carraway

### 290. Seminar (1)

Seminar—1 hour. Prerequisite: consent of instructor and/or graduate standing. Presentation and discussion of faculty and graduate-student research. (S/U grading only.)—F, W, S. (F, W, S.)

### 298. Group Study (1-5)

Prerequisite: consent of instructor. (S/U grading only.)—F, W, S. (F, W, S.)

**299. Research (1-12)**

Prerequisite: consent of instructor. (S/U grading only.)—F, W, S. (F, W, S.)

## Biological and Agricultural Engineering

(College of Agricultural and Environmental Sciences and College of Engineering)

Bryan M. Jenkins, Ph.D., Chair of the Department

**Department Office.** 2030 Bainer Hall;  
530-752-0102;

<http://bae.engineering.ucdavis.edu>

**Faculty**

Gail M. Bornhorst, Ph.D., Assistant Professor

Juliana de Moura Bell, Ph.D., Assistant Professor  
(Food Science and Technology)

Irwin Donis-Gonzalez, Ph.D., Assistant Extension Specialist

Zhiliang (Julia) Fan, Ph.D., Associate Professor

Fadi A. Fathallah, Ph.D., Professor

D. Ken Giles, Ph.D., Professor

Mark E. Grismer, Ph.D., Professor  
(Land, Air and Water Resources)

Bryan M. Jenkins, Ph.D., Professor

Tina Jeoh, Ph.D., Associate Professor

Michael J. McCarthy, Ph.D., Professor  
(Food Science and Technology)

Nitin Nitin, Ph.D., Associate Professor  
(Food Science and Technology)

Ning Pan, Ph.D., Professor (Textiles and Clothing)

David C. Slaughter, Ph.D., Professor

Shrinivas K. Upadhyaya, Ph.D., Professor

Jean S. VanderGheynst, Ph.D., Professor

Stavros G. Vougioukas, Ph.D., Assistant Professor

Ruihong Zhang, Ph.D., Professor

**Emeriti Faculty**

William J. Chancellor, Ph.D., Professor Emeritus

Pictiaw (Paul) Chen, Ph.D., Professor Emeritus

Michael J. Delwiche, Ph.D., Professor Emeritus

Roger E. Garrett, Ph.D., Professor Emeritus

John R. Goss, M.S., Professor Emeritus

Bruce R. Hartsough, Ph.D., Professor Emeritus

David J. Hills, Ph.D., Professor Emeritus

John M. Krochta, Ph.D., Professor Emeritus

Miguel A. Mariño, Ph.D., Professor Emeritus

Kathryn McCarthy, Ph.D., Professor Emeritus

R. Larry Merson, Ph.D., Professor Emeritus

John A. Miles, Ph.D., Professor Emeritus

Stanton R. Morrison, Ph.D., Professor Emeritus

Raul H. Piedrahita, Ph.D., Professor Emeritus

Richard E. Plant, Ph.D., Professor Emeritus

James W. Rumsey, M.S., Senior Lecturer Emeritus

Thomas R. Rumsey, Ph.D., Professor Emeritus

Verne H. Scott, Ph.D., Professor Emeritus

R. Paul Singh, Ph.D., Distinguished Professor Emeritus

James F. Thompson, M.S., Extension Specialist Emeritus

Wesley W. Wallender, Ph.D., Professor Emeritus

Wesley E. Yates, M.S., Professor Emeritus

**Affiliated Faculty**

Tien-Chieh Hung, Ph.D., Assistant Adjunct Professor

Kurt Kornbluth, Ph.D., Assistant Adjunct Professor

Zhongli Pan, Ph.D., Adjunct Professor

Herbert Scher, Ph.D., Professional Researcher

Mir S. Shafii, Ph.D., Lecturer

**Major Programs and Graduate Study.** For the Bachelor of Science program, see the major in **Engineering: Biological and Agricultural**, on page 266; for graduate study, see also **Graduate Studies**, on page 120.

**Minor Programs.** The Department of Biological and Agricultural Engineering offers two minors through the College of Agricultural and Environmental Sciences: Geographic Information Systems and Precision Agriculture.

The minor in Geographic Information Systems is open to all majors, including those in engineering. This minor is for students interested in information processing of spatial data related to remote sensing for geographical and environmental planning and related areas.

The minor in Precision Agriculture is open to all majors, including those in engineering, and acquaints students with recent developments and their applications to agriculture, in geographic information systems, global positioning systems, and variable rate technologies.

The Department of Biological and Agricultural Engineering also administers three minors through the College of Engineering in Energy Science and Technology, Energy Efficiency, and Energy Policy.

**Courses.** Courses are listed under Applied Biological Systems Technology, and Engineering: Biological and Agricultural (Biological Systems Engineering).

## Biological Sciences

(College of Biological Sciences)

**Biology Academic Success Center (BASC).**  
1023 Sciences Laboratory Building; 530-752-0410;  
<http://biosci.ucdavis.edu>  
<http://basc.ucdavis.edu>

**Faculty**

The Biological Science major and the Bodega Marine Laboratory Spring Quarter Program are offered jointly by the departments of the college. The faculty in the college are members of the Departments of Evolution and Ecology; Microbiology; Molecular and Cellular Biology; Neurobiology, Physiology, and Behavior; Plant Biology. See each department for a list of their faculty.

**The Biological Sciences Major**

Departments of Evolution and Ecology; Microbiology and Molecular Genetics; Molecular and Cellular Biology; Neurobiology, Physiology, and Behavior; and Plant Biology

**The Program.** The Biological Sciences major is broad in concept, spanning the numerous core disciplines of biology. The Bachelor of Science (B.S.) and Bachelor of Arts (A.B.) programs includes preparatory work in mathematics, general and organic chemistry, physics, and introductory level biology, as well as upper division core classes emphasizing the breadth of biological sciences. Students in the B.S. degree program complete additional upper division coursework, for which they can choose classes from a variety of different areas such as molecular biology and genetics, animal behavior, plant growth and development, bioinformatics, marine biology, forensics, and microbiology. Students in the Bachelor of Arts (A.B.) program can pursue upper division coursework outside of the biological sciences. Research and internships are encouraged in both programs.

**Career Alternatives.** Both degree programs prepare students for admission to graduate schools or professional schools, leading to either a variety of professional health careers or further study in basic and applied areas of biology. They provide suitable preparation for careers in teaching, biological and biotechnological research with various governmental agencies or private companies, government regulatory agencies, environmental consulting, biological illustration and writing, pharmaceutical sales, biological/environmental law, and biomedical engineering.

**A.B. Major Requirements:**

UNITS

**Preparatory Subject Matter.....45-57**

Biological Sciences 2A-2B-2C ..... 15  
Chemistry 2A-2B ..... 10  
Chemistry 8A-8B or  
118A-118B-118C ..... 6-12  
Mathematics 17A-17B-17C or 21A-21B  
(21C recommended) ..... 8-12  
Physics 7A-7B-7C ..... 12

Mathematics 17A-17B or 21A-21B ..... 8

Physics 1A-1B or 7A-7B-7C ..... 6-12

(Recommended: Chemistry 2C and Math

17C or 21C)

**Depth Subject Matter.....28-36**

Biological Sciences 101 ..... 4  
Biological Sciences 105  
(or 102 + 103) ..... 3-6  
Statistics 100 ..... 4  
Evolution: Evolution and Ecology 100 ..... 4  
\* Select one course from each topic.  
\* Ecology: Environmental Science and Policy  
100 or Evolution and Ecology  
101 ..... 4  
\* Microbiology: Food Science and  
Technology 104; Microbiology 102, 162,  
170 ..... 3-4  
\* Animal Physiology, Behavior or  
Development: Biological Sciences 104,  
Molecular and Cellular Biology 150;  
Neurobiology, Physiology and Behavior 100,  
101, 102, 141 ..... 3-5  
\* Plant Physiology or Development: Plant  
Biology 105\*\*\*, 111, 112, 113,  
116\*\*\* ..... 3-5

**Laboratory Requirement**

Select course(s) for a minimum total of 6 hours/week of laboratory or field work from the list of courses below.

\*\* PLB 105 or PLB 116 may fulfill the topic area and laboratory requirement.

Courses with 3 hours lab or field work/week (select two): Evolution and Ecology 110, 117, 119, 140, 180A, 180B; Exercise Biology 104L, 115; Microbiology 103L; Neurobiology, Physiology and Behavior: 100L, 101L, 121L, 123; Plant Biology 117, 119, other courses with approval of the master adviser.

Courses with 6 hours lab or field work/week (select one): Biological Sciences 180L; Evolution and Ecology 105, 106, 108, 112L, 114; Exercise Biology 106L; Food Science and Technology 104L; Microbiology 104L, 105L; Molecular and Cellular Biology 120L, 140L, 160L; Neurobiology, Physiology and Behavior 111L, 141P; Plant Biology 102, 105\*\*, 116\*\*, 148; other courses with approval of the master adviser.

**Total Units for the Major .....73-93****B.S. Major Requirements:**

UNITS

**Preparatory Subject Matter .....56-66**

Biological Sciences 2A-2B-2C ..... 15  
Chemistry 2A-2B-2C ..... 15  
Chemistry 8A-8B or  
118A-118B-118C ..... 6-12  
Mathematics 17A-17B-17C or 21A-21B  
(21C recommended) ..... 8-12  
Physics 7A-7B-7C ..... 12

**Depth Subject Matter.....42-51**

Genetics: Biological Sciences 101 ..... 4  
Biochemistry: Biological Sciences 105 (or  
102 + 103) ..... 3-6  
Cell Biology: Biological Sciences 104 ..... 3  
Statistics 100 ..... 4  
\* Select one course from each topic.  
\* Evolution: Evolution and Ecology 101 or  
Environmental Science Policy 100 ..... 4  
\* Microbiology: Microbiology 102, 104,  
162, 170; Food Science & Technology  
104 ..... 3-5  
\* Animal Physiology, Behavior or  
Development: Neurobiology, Physiology and  
Behavior 100, 101, 102, 141; Molecular  
and Cellular Biology 150 ..... 3-5  
\* Plant Physiology or Development: Plant  
Biology 105\*\*, 111, 112, 113,  
116\*\* ..... 3-5

**Laboratory Requirement**

Select course(s) for a minimum total of 6 hours/week of laboratory or field work from the list of courses below.

\*\* PLB 105 or PLB 116 may also be used as a restricted elective, unless already used as the Plant Physiology or Development topic course. All other laboratory courses may be used as a restricted elective.

Courses with 3 hours lab or field work/week (select two): Evolution and Ecology 110, 117, 119, 140, 180A, 180B; Exercise Biology 104L, 115; Microbiology 103L; Neurobiology, Physiology and Behavior 100L, 101L, 121L, 123; Plant Biology 119; other courses with approval of the master adviser.

Courses with 6 hours lab or field work/week (select one): Biological Sciences 180L; Evolution and Ecology 105, 106, 108, 112L, 114; Exercise Biology 106L; Food Science and Technology 104L; Microbiology 104L, 105L; Molecular and Cellular Biology 120L, 140L, 160L; Neurobiology Physiology and Behavior 111L, 141P; Plant Biology 102, 105\*\*, 108, 116\*\*, 148; other courses with approval of the master adviser.

#### **Restricted Electives.....11**

Select at least 3 or more courses for a minimum of 11 units from the list of Approved Upper Division Restrictive Electives and/or laboratory courses.

Students may choose any combination of approved courses that align with their academic or career objectives, or choose from a list of sample themes provided on the BASC website at <http://basc.ucdavis.edu/>. Up to 3 of the 11 units may be fulfilled by approved seminar or research courses.

#### **Total Units for the Major .....98-117**

#### **Approved Upper Division Restricted Electives:**

Animal Genetics ANG 105, 107  
Animal Science ANS 104, 119, 123, 131, 142, 170  
Anthropology ANT 151, 152, 153, 154A, 154B, 157  
Anatomy, Physiology and Cell Biology APC 100  
Avian Sciences AVS 100, 150  
Biomedical Engineering BIM 117, 140  
Biological Sciences BIS all upper division courses\*\*\*  
Biotechnology BIT 150, 160, 161A, 161B, 171  
Cell Biology and Human Anatomy CHA 101, 101L  
Chemistry CHE 104, 107A, 107B, 108, 130A, 130B, 150  
Engineering: Computer Science ECS 124  
Education EDU 100, 181  
Environmental Horticulture ENH 102, 105  
Entomology ENT all upper division courses\*\*\*  
Environmental Science and Policy ESP 110, 116N, 121, 123, 124, 150A, 150B, 150C, 151, 151L, 155  
Environmental Toxicology ETX 101, 102B, 103A, 104  
Evolution and Ecology EVE all upper division courses\*\*\*  
Exercise Biology EXB 101, 103, 106, 106L, 110, 111, 124  
Food Science and Technology FST 102A, 104  
Geology GEL 107, 107L, 108, 116N, 141, 141L, 144, 150A, 150B, 150C  
Mathematics MAT 124  
Molecular and Cellular Biology MCB all upper division courses\*\*\*  
Microbiology MIC all upper division courses\*\*\*  
Medical Microbiology MMI 188  
Neurobiology, Physiology, and Behavior NPB all upper division courses\*\*\*  
Philosophy PHI 108  
Plant Biology PLB all upper division courses\*\*\*

Plant Pathology PLP 120, 130  
Plant Sciences PLS 130, 131, 135, 142, 144, 150, 153, 154, 157, 158  
Pathology, Microbiology, and Immunology PMI 126, 126L, 128  
Psychology PSC 121, 122, 123, 124  
Sociology SOC 154  
Soil Science SSC 111  
Science and Technology Studies STS 108, 129, 130A, 131, 164, 180  
University Writing Program UWP 102B, 104T, 111C, 112A  
Wildlife, Fish, and Conservation Biology WFC 100, 101, 110, 110L, 111, 111L, 120, 120L, 121, 122, 130, 134, 134L, 136, 140, 141, 151, 154, 157  
\*\*\* Courses numbered 198 do not fulfill restricted elective units without adviser approval. Discussion section courses, those noted with a "D" do not fulfill restricted elective units. Only 3 units of approved seminar or research courses can be applied to the restrictive electives

#### **Approved Seminar/Research Courses**

Courses in ABI, ANS, BIS, BIT, ENH, ENT, ETX, EVE, EXB, MCB, MIC, NPB, PLB, PLP, PLS, VEN, WFC numbered 189, 190/190C, 192, 194H, 199, as well as BIS 122P, 123, 133; EVE 111; MIC 191; MCB 138, 139, 148, 158, 178, 191, 193; NPB 139, 159, 169

#### **Minor Program Requirements:**

	UNITS
<b>Biological Sciences .....</b>	<b>18</b>

Complete at least three units from each of the five numbered groups to total at least 18 units. Appropriate alternative courses may be used with approval of an adviser.

(1) *Cell and Molecular Biology*: Biological Sciences 101, 102, 105 ..... 3-4  
(2) *Animal Biology*: Anthropology 151, Anatomy, Physiology and Cell Biology 100/ Neurobiology, Physiology, and Behavior 123; Entomology 100; Evolution and Ecology 105, 112 and 112L, 134; Nematology 100, 110; Neurobiology, Physiology, and Behavior 100, 101, 102, 117; Wildlife, Fish, and Conservation Biology 110, 111, 120..... 2-5  
(3) *Microbiology*: Microbiology 101, 102, 162; Pathology, Microbiology, and Immunology 128; Plant Biology/Plant Pathology 148..... 3-5  
(4) *Plant Biology*: Environmental and Resource Sciences/Plant Sciences 144; Plant Biology 105, 111, 112, 116, 126; Plant Biology/Plant Pathology 148; Plant Sciences 141, 171..... 3-5  
(5) *Evolution and Ecology*: Anthropology 151, 152, 154; Entomology 100; Evolution and Ecology 100, 101, 108, 115, 117, 119, 138, 140, 147; Plant Biology 102, 108, 117, 119, 143; Plant Pathology 150; Plant Sciences 142, 146; Wildlife, Fish, and Conservation Biology 151 ..... 3-5  
Additional courses (if necessary) from above numbered groups to reach 18 units.

**Advisors and Advising.** Information on the Biological Sciences major or minor can be obtained at the Biology Academic Success Center (BASC) in 1023 Sciences Laboratory Building; 530-752-0410; <http://basc.ucdavis.edu/>.

**Citation for Outstanding Performance.** The College of Biological Sciences confers Citations for Outstanding Performance on undergraduates majoring in Biological Sciences who have demonstrated superior academic performance and individual achievement in research. Students who wish to be considered for a citation must first meet or exceed a specified grade point average and participate in an appropriate research project.

**Teaching Credential Subject Representative.**  
Associate Director of Teacher Education (School of

Education); see the Teaching Credential/M.A. Program on page 124.

**Bodega Marine Laboratory Program**  
See also Biological Sciences, *Bodega Marine Laboratory Program*, on page 197.

<http://bml.ucdavis.edu/>

A full quarter of undergraduate course work in marine biology is available each spring quarter at the Bodega Marine Laboratory, located in Bodega Bay, California. Course offerings include lecture and laboratory instruction in the developmental biology and physiological adaptation of marine organisms, and population biology and ecology; a weekly colloquium; and an intensive individual research experience under the direction of laboratory faculty (Biological Sciences courses BIS 122, 122P, 123, 199; Neurobiology, Physiology, and Behavior NPB 141, 141P). This is a 15-unit program and course offerings and instructors may vary from year to year.

The program is residential, with students housed on the laboratory grounds. Participants are assessed a room and board fee in addition to standard campus registration fees. An application is required. Obtain forms from the Bodega Marine Laboratory website listed above. Applications are due January 31 for spring quarter. Additional information on the Bodega Marine Laboratory Program is available at the Biology Academic Success Center (BASC) in 1023 Sciences Laboratory Building, or directly from Bodega Marine Laboratory, P.O. Box 247, Bodega Bay, CA 94923 707-875-2211.

#### **Courses in Biological Sciences (BIS)**

##### **Lower Division**

##### **2A. Introduction to Biology: Essentials of Life on Earth (5)**

Lecture—3 hours; discussion—2 hours. Essentials of life including sources and use of energy, information storage, responsiveness to natural selection and cellularity. Origin of life and influence of living things on the chemistry of the Earth. Not open for credit to students who have completed course 1A with a grade of C- or better. GE credit: SciEng | SE.—F, W, S, Su. {F, W, S, Su.}

##### **2B. Introduction to Biology: Principles of Ecology and Evolution (5)**

Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: grade of C- in course 1A or 2A. Introduction to basic principles of ecology and evolutionary biology, focusing on the fundamental mechanisms that generate and maintain biological diversity across scales ranging from molecules and genes to global processes and patterns. Not open for credit for student who have completed Biological Sciences 1B with a grade of C- or better. GE credit: SciEng | QL, SE, SL, VL.—F, W, S, Su. {F, W, S, Su.}

##### **2C. Introduction to Biology: Biodiversity and the Tree of Life (5)**

Lecture—4 hours; laboratory—3 hours. Prerequisite: course 1B or 2B completed with a C- or better. Introduction to organismal diversity, using the phylogenetic tree of life as an organizing theme. Lectures and laboratories cover methods of phylogenetic reconstruction, current knowledge of the tree of life, and the evolution of life's most important and interesting innovations. Not open for credit to students who have completed course 1C with a grade of C- or better. GE credit: SciEng | OL, QL, SE, SL, VL.—F, W, S, Su. {F, W, S, Su.}

##### **5. Exploring Biological Sciences (1)**

Seminar—1 hour. Prerequisite: consent of instructor. Enrollment limited to first year CBS students. Introduction to biology at UC Davis through discussions with faculty and speakers from industry and medicine. (P/NP grading only.)—F, W, S. {F, W, S.}

##### **10. Everyday Biology (4)**

Lecture—3 hours; discussion—1 hour. Everyday biological concepts using contemporary readings for non-scientists. Key topics include: personal genomics; food and health; climate and evolution; brain biology and the law. Innovative projects apply bio-

logical concepts to current events. For students not specializing in biology. Not open for credit to students who have completed course 2A, or 2B, or 2C, or 10V or Nematology 10V or equivalent. GE credit: SciEng, Wrt | SE, SL, WE.—F, W, S. (F, W, S.)

### **11. Issues in the Life Sciences (2)**

Lecture—1 hour; discussion—1 hour. Prerequisite: enrollment limited to BUP students, consent of instructor. The range of subjects and approaches in the field of biology, including both basic and applied research topics.—F. (F.)

### **11L. Basic Life Sciences Laboratory (1)**

Laboratory—6 hours. Prerequisite: enrollment limited to BUP students; consent of instructor required. Basic laboratory skills in life sciences research, including microbiology, molecular biology, and genetics.—Su. (Su.)

### **20Q. Modeling in Biology (2)**

Lecture—1 hour; discussion—1 hour. Prerequisite: Mathematics 16B (may be taken concurrently). Introduction to the application of quantitative methods to biological problems. Students will use a mathematical software package to tackle problems drawn from all aspects of biology. Offered irregularly.—Mogilner, Sutter

### **92. Internship in Biological Sciences (1-12)**

Internship—3-36 hours. Prerequisite: lower division standing; consent of instructor. Restricted to lower division standing. (P/NP grading only.)

### **98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

### **99. Special Study for Undergraduates (1-5)**

Prerequisite: lower division standing; consent of instructor. Restricted to lower division standing. (P/NP grading only.)

## **Upper Division**

### **101. Genes and Gene Expression (4)**

Lecture—4 hours. Prerequisite: course 2A and 2B; Chemistry 8A or 118A or 128A; Statistics 100 or 13 or 102 or 130A (Statistics 100 preferred). Nucleic acid structure and function; gene expression and its regulation; replication; transcription and translation; transmission genetics; molecular evolution. GE credit: SciEng | QL, SE, SL.—F, W, S, Su. (F, W, S, Su.) Brady, Comai, Dvorak, Ellefson-Crowder, Engebrecht, Kliebenstein, Langley, Lott, Nord, Rodriguez, Ross-Iberra, Turelli

### **101D. Genes and Gene Expression**

#### **Discussion (1)**

Discussion—1 hour. Prerequisite: course 101 (concurrently); consent of instructor. Discussion and problem solving related to fundamental principles of classical and molecular genetics as presented in course 101. (P/NP grading only.)—F, W, S. (F, W, S.) Brady, Comai, Dvorak, Ellefson-Crowder, Engebrecht, Kliebenstein, Langley, Lott, Nord, Rodriguez, Ross-Iberra, Turelli

### **102. Structure and Function of Biomolecules (3)**

Lecture—3 hours. Prerequisite: course 1A or 2A; Chemistry 8B or 118B or 128B. Structure and function of macromolecules with emphasis on proteins, catalysis, enzyme kinetics, lipids, membranes, and proteins as machines. Only one unit of credit for students who have completed Animal Biology 102 & 1.5 units of credit for students who have completed Biological Science 105. GE credit: SciEng | QL, SE.—F, W, S, Su. (F, W, S, Su.) Cheng, Gasser, Hilt, Leal, Monfared

### **103. Bioenergetics and Metabolism (3)**

Lecture—3 hours. Prerequisite: course 102. Fundamentals of the carbon, nitrogen, and sulfur cycles in nature, including key reactions of biomolecules such as carbohydrates, amino acids, lipids, and nucleotides, and of energy production and use in different types of organisms. Principles of metabolic regulation. 1.5 units of credit for student who has completed course 105; 1 unit of credit if students who

has completed Animal Biology 103. GE credit: SciEng | SE.—F, W, S, Su. (F, W, S, Su.) Callis, Fiehn, Hilt, Inoue, Monfared, Zerbe

### **104. Cell Biology (3)**

Lecture—3 hours. Prerequisite: course 101; 102 or 105. Membrane receptors and signal transduction; cell trafficking; cell cycle; cell growth and division; extracellular matrix and cell-cell junctions; cell development; immune system. GE credit: SciEng | SE.—F, W, S. (F, W, S.) Carrasco, Dinesh-Kumar, S. Lin, B. Liu, McNally, Privalsky, Starr, Xu

### **105. Biomolecules and Metabolism (3)**

Lecture—3 hours. Prerequisite: courses 1A, 1B, and 1C, or 2A, 2B, and 2C; Chemistry 8B or 118B or 128B. Fundamentals of biochemical processes, with emphasis on protein structure and activity; energy metabolism; catabolism of sugars, amino acids, and lipids; and gluconeogenesis. One and one half units of credit for students who have completed course 102 or 103; no credit for students who have completed both course 102 and 103; one unit of credit for students who have completed Animal Biology 102 or 103; no credit for students who have completed both Animal Biology 102 and 103. GE credit: SciEng | SE, QL.—F, W, S. (F, W, S.) Hilt, Thig

### **122. Population Biology and Ecology (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 1A, 1B, 1C, or 2A, 2B, 2C; residence at Bodega Marine Laboratory required. Biological and physical processes affecting plant and animal populations in the rich array of habitats at the Bodega Marine Laboratory ecological preserve. Emphasis on field experience, with complementing lectures to address population and community processes. See Bodega Marine Laboratory Program. GE credit: SciEng | OL, QL, SE, SL, VL, WE.—S. (S.) Morgan

### **122P. Population Biology and Ecology/Advanced Laboratory Topics (5)**

Laboratory—12 hours; discussion—1 hour. Prerequisite: course 122 concurrently. Residence at Bodega Marine Laboratory required. Training in scientific research, from hypothesis testing to publication, including methods of library research. Research related to topic covered in course 122. Final presentation both oral and written. See Bodega Marine Laboratory Program. GE credit: SciEng | SE, VL, WE.—S. (S.) Morgan

### **123. Undergraduate Colloquium in Marine Science (1)**

Seminar—1 hour. Prerequisite: enrolled student at the Bodega Marine Laboratory. Series of weekly seminars by recognized authorities in various disciplines of marine science from within and outside the UC system. Includes informal discussion with speaker. Course will be held at Bodega Marine Laboratory. (P/NP grading only.) (See above description for Bodega Marine Laboratory Program.)—S. (S.) Cherr, Morgan

### **124. Coastal Marine Research (3)**

Laboratory—6 hours; fieldwork—6 hours; laboratory/discussion—1 hour. Prerequisite: upper division standing or consent of instructor; concurrent enrollment in at least one course from Environmental Science and Policy 124, 152, Evolution and Ecology 106, 110, 114; residence at or near Bodega Marine Lab required. Student must complete the application at <http://www.bml.ucdavis.edu>. Independent research on topics related to the accompanying core Bodega Marine Laboratory summer courses. Students will select one instructor to be primary mentor, but integrative topics that draw on the expertise of several BML faculty members will be encouraged. May be repeated two times for credit. GE credit: SciEng | OL, QL, SE, VL, WE.—Su. (Su.) Hill, Gaylord, Largier, Sanford

### **132. Introduction to Dynamic Models in Modern Biology (4)**

Lecture—3 hours; laboratory—2 hours. Prerequisite: Mathematics 16C, Statistics 13, one lower division course in biology, or the equivalents. Dynamic modeling in the biological sciences, including matrix

models, difference equations, differential equations, and complex dynamics. Examples include classic models in ecology, cell biology, physiology, and neuroscience. Emphasis on understanding models, their assumptions, and implications for modern biology. GE credit: SciEng, Wrt | QL, SE, SL, VL, WE.—Grosberg

### **133. Collaborative Studies in Mathematical Biology (3)**

Lecture/discussion—3 hours. Prerequisite: Mathematics 16ABC or the equivalent, one course from course 1A, 1B, 1C, 2A, 2B, 2C, 10 or the equivalent in biology, consent of instructor. Interdisciplinary research and training that uses mathematics and computation to solve current problems in biology. May be repeated six times for credit. Offered irregularly. GE credit: SciEng | QL, SE, SL, VL, WE.

### **134. Systems Biology: From Biological Circuits to Biological Systems (2)**

Lecture/discussion—2 hours; term paper. Prerequisite: course 101 and one course from Molecular and Cellular Biology 121, 161 or Plant Biology 113, Mathematics 16ABC or 17ABC; or consent of instructor. Applying systems theory to understand the properties of biological networks in a variety of model organisms. Emphasis on both local biological circuits, and genome-scale biological networks. Topics include network motifs, robustness, modeling, emergent properties and integration of networks. GE credit: SciEng | OL, QL, SE, VL—Brady

### **180L. Genomics Laboratory (5)**

Lecture—2 hours; laboratory—6 hours; discussion—1 hour. Prerequisite: course 181; course 183 (may be taken concurrently); Molecular and Cellular Biology 182. Computational approaches to model and analyze biological information about genomes, transcriptomes, and proteomes. Topics include genome assembly and annotation, mRNA and small RNA profiling, proteomics, protein-DNA and protein-protein interactions, network analysis, and comparative genomics. Computer programming experience not required. Students who have received credit for taking Computer Science Engineering 124 or Biotechnology 150 will receive 3 units for completing course 180L. GE credit: SciEng | QL, SE, VL.—S. (S.) Brady, Dawson, Dinesh-Kumar, Harada, Korf, Maloof

### **181. Comparative Genomics (3)**

Lecture—3 hours. Prerequisite: course 101. Comparison of genomes at the population and species level. Genomic techniques for mapping disease (and other) genes, reconstruction of evolutionary history and migration patterns, determination of gene function, prediction of organismal traits, and metagenomics: determination of community composition and function. GE credit: SciEng | QL, SE, SL.—F. (F.) Dawson, Maloof

### **183. Functional Genomics (3)**

Lecture—3 hours. Prerequisite: course 101; course 102 or 105 recommended. Overview of genomic methodologies and key biological findings obtained using genome-wide analyses. RNA profiling, small RNAs, epigenomics, chromatin immunoprecipitation, protein-DNA interactions, proteomics and network analysis. GE credit: SciEng | QL, SE, VL.—S. (S.) Brady, Maloof

### **192. Internship in Biological Sciences (1-12)**

Internship—3-36 hours. Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

### **194H. Research Honors (2)**

Independent study—6 hours. Prerequisite: senior standing. Students majoring in Biological Sciences who have completed two quarters (3-5 units per quarter) of 199 and who qualify for the honors program as defined by the current catalog. Opportunity for Biological Sciences majors to pursue intensive research culminating in the writing of a senior thesis with the guidance of faculty advisers. (P/NP grading only.) GE credit: SE, WE.

### 195A. Science Teaching Internship Program (4)

Lecture/discussion—2 hours; internship—6 hours. Prerequisite: upper division standing in a science major or consent of instructor. Major in science; junior or senior status (based on units); application and interview; class size limited to 24 students. Basic teaching techniques including lesson planning, classroom management, and presentation skills. Interns spend time in K-12 science classrooms working with a master teacher observing, assisting with labs and activities, managing students, and teaching lessons. (P/NP grading only.) Offered irregularly.

### 195B. Science Teaching Internship (1-5)

Internship—3-15 hours. Prerequisite: course 195A. Reinforcement of teaching techniques learned in 195A with additional classroom experiences in K-12 science classrooms working with a master teacher observing, assisting with labs and activities, managing students, and teaching lessons. May be repeated one time for credit with consent of instructor. (P/NP grading only.)

### 197T. Tutoring in Biological Sciences (1-5)

Discussion—2-6 hours. Prerequisite: upper division standing and consent of instructor. Assisting the instructor by tutoring students in one of the Biological Sciences' regular courses. May be repeated for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

### 198. Directed Group Study (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

### 199. Special Study in Biological Sciences (1-5)

Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)—F, W, S. (F, W, S.) Cherr, Morgan

## Graduate

### 298. Group Study (1-5)

Prerequisite: consent of instructor. College of Biological Sciences staff members may offer group study courses under this number.

## Biomedical Engineering (A Graduate Group)

J. Kent Leach, Ph.D., Chairperson of the Group  
530-754-9149

**Group Office.** 2316 Genome and Biomedical Sciences Facility 530-752-2611;  
<http://bme.ucdavis.edu/graduate/>

## Faculty

Ralph C. Aldredge, III, Ph.D., Professor  
(Mechanical and Aerospace Engineering)  
Kyriacos Athanasiou, Ph.D., Distinguished Professor  
(Biomedical Engineering, Orthopaedic Surgery)  
Sharon Aviran, Ph.D., Assistant Professor  
(Biomedical Engineering)  
Keith Baar, Ph.D., Associate Professor  
(Physiology & Membrane Biology, Neurobiology, Physiology, and Behavior)  
Ramsey D. Badawi, Ph.D., Associate Professor  
(Diagnostic Radiology, Biomedical Engineering)  
Stanley Benedict, Ph.D., Professor  
(Radiation Oncology)  
Craig J. Benham, Ph.D., Professor  
(Biomedical Engineering, Mathematics)  
John M. Boone, Ph.D., Professor  
(Diagnostic Radiology, Biomedical Engineering)  
James Chan, Ph.D., Assistant Professor  
(Pathology and Laboratory Medicine)  
Abhijit J. Chaudhari, Ph.D., Assistant Professor  
(Diagnostic Radiology)  
Ye Chen-Izu, Ph.D., Associate Professor  
(Biomedical Engineering, Pharmacology)  
Simon R. Cherry, Ph.D., Distinguished Professor  
(Biomedical Engineering, Radiology)

Blaine Christiansen, Ph.D., Assistant Professor  
(Orthopaedic Surgery, Medicine)  
Colleen Clancy, Ph.D., Professor (Pharmacology)  
Cristina Davis, Ph.D., Professor  
(Mechanical and Aerospace Engineering)  
Sonja Dieterich, Ph.D., Associate Professor  
(Radiation Oncology)  
Yong Duan, Ph.D., Professor  
(Biomedical Engineering)  
Marc T. Facciotti, Ph.D., Assistant Professor  
(Biomedical Engineering)  
Fadi A. Fathallah, Ph.D., Professor  
(Biological and Agricultural Engineering)  
Katherine W. Ferrara, Ph.D., Professor  
(Biomedical Engineering)  
David Fyhrie, Ph.D., Professor (Orthopaedic Surgery, Medicine, Biomedical Engineering)  
Jeffery C. Gibeling, Ph.D., Professor  
(Chemical Engineering and Materials Science)  
Mark Goldman, Ph.D., Professor  
(Neurobiology, Physiology, and Behavior)  
Frederic Gorin, Ph.D., Professor  
(Neurology)  
Eleonora Grandi, Ph.D., Assistant Professor  
(Pharmacology)  
Dominik R. Haudenschild, Ph.D., Associate Professor  
(Orthopaedic Surgery)  
David A. Hawkins, Ph.D., Professor  
(Neurobiology, Physiology, and Behavior)  
Volkmar Heinrich, Ph.D., Associate Professor  
(Biomedical Engineering)  
Johannes W. Hell, Ph.D., Professor (Pharmacology)  
Stephen Howell, M.D., Adjunct Professor  
(Biomedical Engineering)  
Thomas Huser, Ph.D., Adjunct Professor  
(Internal Medicine)  
Sanjay Joshi, Ph.D., Associate Professor  
(Mechanical and Aerospace Engineering)  
Thomas Jue, Ph.D., Professor (Biological Chemistry)  
Patrice Koehl, Ph.D., Associate Professor  
(Computer Science)  
Gerald J. Kost, Ph.D., M.D., Professor (Pathology)  
Tonya L. Kuhl, Ph.D., Professor (Chemical Engineering and Materials Science, Biomedical Engineering)  
Kit S. Lam, Ph.D., Professor  
(Biochemistry & Molecular Medicine)  
J. Kent Leach, Ph.D., Professor (Biomedical Engineering, Orthopaedic Surgery)  
Jamal Lewis, Ph.D., Assistant Professor  
(Biomedical Engineering)  
Angelique Louie, Ph.D., Professor  
(Biomedical Engineering)  
Laura Marcu, Ph.D., Professor  
(Biomedical Engineering, Neurological Surgery)  
Dennis L. Matthews, Ph.D., Professor  
(Neurological Surgery)  
Alexander Mogilner, Ph.D., Professor (Mathematics)  
Christopher J. Murphy, D.V.M., Ph.D., Professor  
(Surgical & Radiological Sciences)  
Nitin Nitin, Ph.D., Associate Professor  
(Food Science and Technology, Biological and Agricultural Engineering)  
Jan Nolta, Ph.D., Professor (Internal Medicine)  
Tingrui Pan, Ph.D., Associate Professor  
(Biomedical Engineering)  
Atul Parikh, Ph.D., Professor  
(Biomedical Engineering, Chemical Engineering and Materials Science)  
Anthony G. Passerini, Ph.D., Associate Professor  
(Biomedical Engineering)  
Jinyi Qi, Ph.D., Professor (Biomedical Engineering)  
Bahram Ravani, Ph.D., Professor (Mechanical and Aerospace Engineering)  
A. Hari Reddi, Ph.D., Professor (Orthopaedic Surgery, Medicine)  
Alexander Revzin, Ph.D., Professor  
(Biomedical Engineering)  
Crystal M. Ripplinger, Ph.D., Assistant Professor  
(Pharmacology)  
David Rocke, Ph.D., Distinguished Professor  
(Biomedical Engineering, Public Health Sciences)  
Leonor Saiz, Ph.D., Associate Professor (Biomedical Engineering)  
Nesrin Sarigul-Klijn, Ph.D., Professor  
(Mechanical and Aerospace Engineering)

Michael A. Savageau, Ph.D., Distinguished Professor (Biomedical Engineering)  
J. Anthony Seibert, Ph.D., Professor  
(Diagnostic Radiology)  
Erkin Seker, Ph.D., Assistant Professor  
(Electrical and Computer Engineering)  
Eduardo Silva, Ph.D., Assistant Professor  
(Biomedical Engineering)  
Scott I. Simon, Ph.D., Professor  
(Biomedical Engineering)  
Vivek J. Srinivasan, Ph.D., Assistant Professor  
(Biomedical Engineering)  
Susan M. Stover, D.V.M., Ph.D., Professor  
(Anatomy, Physiology and Cell Biology)  
Julie Sutcliffe, Ph.D., Associate Professor (Biomedical Engineering, Medicine: Hematology and Oncology)  
Ilias Tagkopoulos, Ph.D. Assistant Professor  
(Computer Science, Genome Center)  
Yoshikazu Takada, M.D., Professor (Dermatology)  
Cheemeng Tan, Ph.D., Assistant Professor  
(Biomedical Engineering)  
Alice Tarantal, Ph.D., Professor (Pediatrics, Cell Biology and Human Anatomy, Medicine)  
Sebastian Wachsmann-Hogiu, Ph.D., Associate Professor  
(Pathology and Laboratory Medicine)  
John Werner, Ph.D., Professor (Ophthalmology)  
Jeffrey Walton, Ph.D., Associate Research Physicist  
(NMR Facility)  
Soichiro Yamada, Ph.D., Associate Professor  
(Biomedical Engineering)  
Tokiharu Yamamoto, Ph.D., Assistant Professor  
(Radiation Oncology)

## Emeriti Faculty

Maury L. Hull, Ph.D., Distinguished Professor  
Emeritus (Mechanical and Aerospace Engineering, Biomedical Engineering)

**Graduate Study.** The Graduate Group in Biomedical Engineering offers programs of study and research leading to the M.S. and Ph.D. degrees. The programs of study prepare students for professional work in the effective integration of engineering with medical and biological sciences. Research strengths lie in the areas of imaging, tissue engineering and regenerative medicine, sensor and MEMs systems, cellular and molecular mechanics, computational modeling, targeted therapeutics, orthopedic biomechanics, biofluids and transport, and human movement. This broad interdepartmental program is best suited for students who are capable of and comfortable with considerable independence. Each student, together with an adviser, defines a specific course of study suited to individual goals.

**Preparation.** The Group regards strong competence in mathematics and engineering as necessary for successful completion of study. Prior course work in these areas is emphasized in the evaluation of applications. Some undergraduate training can be acquired after admission to the Group, but it may require an additional year of study.

**Courses.** See [Engineering: Biomedical](#), on page 271.

## Biophysics (A Graduate Group)

John Voss, Ph.D., Chairperson of the Group

**Group Office.** 310 Life Sciences;  
530-752-4863;  
<http://bph.ucdavis.edu/>

## Faculty

Jawdat Al-Bassam, Ph.D., Assistant Professor  
(Molecular and Cellular Biology)  
James B. Ames, Ph.D., Associate Professor  
(Chemistry)  
Enoch Baldwin, Ph.D., Associate Professor  
(Molecular and Cellular Biology)  
R. David Britt, Ph.D., Professor (Chemistry)  
Tsung-Yu Chen, Ph.D., Professor (Neurology)

R. Holland Cheng, Ph.D., Professor (*Molecular and Cellular Biology*)  
 Colleen Clancy, Ph.D., Associate Professor (*Pharmacology*)  
 Daniel L. Cox, Ph.D., Professor (*Physics*)  
 Stephen P. Cramer, Ph.D., Professor (*Chemistry*)  
 Yong Duan, Ph.D., Associate Professor (*Applied Science*)  
 Robert H. Fairclough, Ph.D., Associate Professor (*Neurology*)  
 Roland Faller, Ph.D., Professor (*Chemical and Material Engineering*)  
 Katherine Ferrara, Ph.D., Professor (*Biomedical Engineering*)  
 Andrew J. Fisher, Ph.D., Professor (*Chemistry, Molecular and Cellular Biology*)  
 Alla F. Fomina, Ph.D., Assistant Professor (*Physiology and Membrane Biology*)  
 David Goodin, Ph.D., Professor (*Chemistry*)  
 Volkmar Heinrich, Ph.D., Assistant Professor (*Biomedical Engineering*)  
 Thomas Jue, Ph.D., Professor (*Med: Biochemistry and Molecular Medicine*)  
 Patrice Koehl, Ph.D., Associate Professor (*Computer Science Engineering*)  
 Stephen C. Kowalczykowski, Ph.D., Professor (*Microbiology and Molecular Genetics*)  
 Denise Krol, Ph.D., Professor (*Applied Science*)  
 Tonya L. Kuhl, Ph.D., Associate Professor (*Biomedical Engineering, Chemical and Material Engineering*)  
 Delmar Larsen, Ph.D., Assistant Professor (*Chemistry*)  
 Janine M. LaSalle, Ph.D., Professor (*Microbiology and Immunology*)  
 Julie A. Leary, Ph.D., Professor (*Chemistry, Molecular and Cellular Biology*)  
 Gang-Yu Liu, Ph.D., Professor (*Chemistry*)  
 Marjorie L. Longo, Ph.D., Professor (*Chemical and Material Engineering*)  
 Laura Marcu, Ph.D., Associate Professor (*Biomedical Engineering*)  
 Atul N. Parikh, Ph.D., Professor (*Biomedical Engineering, Chemical and Material Engineering*)  
 Subhadip Raychaudhuri, Ph.D., Assistant Professor (*Biomedical Engineering*)  
 Niels G. Ronbeck-Jensen, Ph.D., Professor (*Mathematics, Applied Science, Mechanical and Aerospace Engineering*)  
 Jon Sack, Ph.D., Assistant Professor (*Anesthesiology and Pain Medicine, Physiology and Membrane Biology*)  
 Leonor Saiz, Ph.D., Associate Professor (*Biomedical Engineering*)  
 Daisuke Sato, Ph.D., Assistant Professor (*Pharmacology*)  
 Erkin Seker, Ph.D., Assistant Professor (*Electrical and Computer Engineering*)  
 Justin Siegel, Ph.D., Assistant Professor (*Chemistry, Biochemistry and Molecular Medicine*)  
 Scott I. Simon, Ph.D., Professor (*Biomedical Engineering*)  
 Rajiv R. Singh, Ph.D., Professor (*Physics*)  
 Alexei Stuchebrukhov, Ph.D., Professor (*Chemistry*)  
 Ilias Tagkopoulos, Ph.D., Associate Professor (*Computer Science Engineering*)  
 Steven M. Theg, Ph.D., Professor (*Plant Biology*)  
 Michael D. Toney, Ph.D., Professor (*Chemistry*)  
 John C. Voss, Ph.D., Professor (*Biochemistry and Molecular Medicine*)  
 David K. Wilson, Ph.D., Professor (*Molecular and Cellular Biology*)  
 Vladimir Yarov-Yarovoy Ph.D., *[Biochemistry and Molecular Medicine, Anesthesiology and Pain Medicine, Physiology and Membrane Biology and Membrane Biology]*

## Emeriti Faculty

Morton Bradbury, Ph.D., Professor Emeritus  
 John H. Crowe, Ph.D., Professor Emeritus  
 William H. Fink, Ph.D., Professor Emeritus  
 Jerry L. Hedrick, Ph.D., Professor Emeritus  
*Distinguished Graduate Mentoring Award*  
 Gerd N. LaMar, Ph.D., Professor Emeritus  
 Carl W. Schmid, Ph.D., Professor Emeritus

Yin Yeh, Ph.D., Professor Emeritus

**Graduate Study.** The Biophysics Graduate Group offers a program leading to a Ph.D. degree in biophysics. The interdisciplinary program prepares students to conduct independent research at the interface of physics, chemistry, and biology. Faculty members have particular research interests in structural biology, membrane dynamics, mechanisms of catalysis and energy transduction, computational biology, theory, neuroscience, and imaging. Students choose from the broad biophysics research areas a research laboratory that matches their interests and career goals.

## Courses in Biophysics (BPH)

### Graduate

#### 200A. Current Techniques in Biophysics (3)

Lecture—3 hours. Prerequisite: Biological Sciences 102 or equivalent; Chemistry 110A or equivalent. Current techniques in Biophysics. Topics in 200A include mathematical methods, modeling, mass spectrometry, stochastic process, scanning probe microscopy, electron microscopy, fluorescence, membrane diffusion/mechanics, and single particle tracking. (S/U grading only.)—W. (W.) Faller

#### 200B. Current Techniques in Biophysics (3)

Lecture—3 hours. Prerequisite: Biological Sciences 102 or equivalent; Chemistry 110A. Current Techniques in Biophysics. Topics include protein folding, membrane structure and dynamics, Raman spectroscopy, fluorescence resonance energy transfer, time resolved fluorescence, quantum dot, fluorescence imaging, esr, high resolution nmr, and in vivo nmr. (S/U grading only.)—S. (S.) Jue

#### 200LA. Biophysics Laboratory (3)

Laboratory—18 hours. Prerequisite: course 200 (may be taken concurrently). One five-week laboratory assignment in the research laboratory of a Biophysics Graduate Group faculty member. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated for credit four times.—F, W, S. (F, W, S.)

#### 200LB. Biophysics Laboratory (6)

Laboratory—two 18-hour rotations. Prerequisite: course 200 (may be taken concurrently). Two five-week laboratory assignments in the research laboratories of Biophysics Graduate Group faculty members. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated for credit two times.—F, W, S. (F, W, S.)

#### 231. Biological Nuclear Magnetic Resonance (3)

Lecture—3 hours. Prerequisite: Molecular and Cellular Biology 221A or the equivalent or consent of instructor. Principles and applications of magnetic resonance in biomedicine. Fundamental concepts and the biophysical basis for magnetic resonance applications in areas of tissue characterization/imaging, metabolic regulation, and cellular bioenergetics. (Same course as Biological Chemistry 231.) Offered in alternate years.—S. (S.) Jue

#### 241. Membrane Biology (3)

Lecture—3 hours. Prerequisite: Biological Sciences 102, 103, 104 or consent of instructor. Advanced topics on membrane biochemistry and biophysics. Relationship of the unique properties of biomembranes to their roles in cell biology and physiology. (Same course as Molecular and Cellular Biology 241.)—S. (S.) Crowe, Longo, Voss

#### 255. Biophotonics in Medicine and the Life Sciences (3)

Lecture/discussion—3 hours. Prerequisite: Physics 108 and Biology 101-105; Biomedical Engineering 202 highly recommended; graduate standing. Introduction to the science and technology of biomedical optics and photonics, with an overview of applications in medicine and the life sciences. Emphasis on research supported by the NSF Center for Biophotonics at UC Davis Medical Center. (Same course as Applied Science 255 and Biomedical Engineering 255.)—W. (W.) Chuang, Matthews

tonics at UC Davis Medical Center. (Same course as Applied Science 255 and Biomedical Engineering 255.)—W. (W.) Chuang, Matthews

#### 271. Optical Methods in Biophysics (4)

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: Biological Sciences 102 or the equivalent, Applied Science Engineering 108B or the equivalent, and Chemistry 110A or the equivalent. Principal optical techniques used to study biological structures and their related functions. Specific optical techniques useful in the studies of protein-nucleic acid, protein-membrane and protein-protein interactions. Biomedical applications of optical techniques. (Same course as Applied Science Engineering 271.)—S. (S.) Huser, Parikh, Yeh

#### 290. Biophysics Seminar (1)

Seminar—1 hour. Prerequisite: graduate standing or consent of instructor. Presentation of current research by experts in biophysics. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

#### 290C. Research Conference in Biophysics (1)

Discussion—1 hour. Prerequisite: graduate standing in Biophysics and/or consent of instructor; course 299 concurrently. Presentation and discussion of faculty and graduate-student research in biophysics. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

#### 293. Introduction to Research Topics (1)

Seminar—1 hour. Presentation of current research activities of the Biophysics Graduate Group faculty. Facilitation of students in developing their research interest, and promoting collegial interactions. May be repeated one time for credit if topics differ. (S/U grading only.)—F. (F.)

#### 298. Group Study (1-5)

(S/U grading only.)

#### 299. Research (1-12)

(S/U grading only.)

## Biostatistics (A Graduate Group)

Bruce Rannala, Ph.D. (*Evolution and Ecology*), Chairperson of the Group

**Group Office.** 4118 Mathematical Sciences Building 530-692-5194; <http://biostat.ucdavis.edu/>

### Faculty

Sharif Aly, Ph.D., Assistant Professor (*Population Health & Reproduction*)  
 Rahman Azari, Ph.D., Lecturer (*Statistics*)  
 Heejung Bang, Ph.D., Associate Professor (*Public Health Sciences*)  
 Laurel Beckett, Ph.D., Professor (*Public Health Sciences*)  
 Prabir Burman, Ph.D., Professor (*Statistics*)  
 Hao Chen, Ph.D., Assistant Professor (*Statistics*)  
 Andrew J. Clifford, Ph.D., Professor (*Nutrition*)  
 Christiana Drake, Ph.D., Professor (*Statistics*)  
 Thomas B. Farver, Ph.D., Professor (*Population Health and Reproduction*)  
 Emilio Ferrer, Ph.D., Associate Professor (*Psychology*)  
 Valdimir Filkov, Ph.D., Associate Professor (*Computer Science*)  
 Danielle Harvey, Ph.D., Associate Professor (*Public Health Sciences*)  
 Fushing Hsieh, Ph.D., Professor (*Statistics*)  
 Ana-Maria Iosif, Ph.D., Assistant Professor (*Public Health Sciences*)  
 Jiming Jiang, Ph.D., Professor (*Statistics*)  
 Philip H. Kass, Ph.D., Professor (*Population Health and Reproduction*)  
 Kyoungmi Kim, Ph.D., Associate Professor (*Public Health Sciences*)  
 Ian Korf, Ph.D., Assistant Professor (*Evolution and Ecology*)  
 Thomas Lee, Ph.D., Professor (*Statistics*)  
 Chin-Shang Li, Ph.D., Assistant Professor (*Public Health Sciences*)

**Fall 2011 and on Revised General Education (GE): AH=Arts and Humanities; SE=Science and Engineering; SS=Social Sciences;**

**ACGH=American Cultures; DD=Domestic Diversity; OL=Oral Skills; QL=Quantitative; SL=Scientific; VL=Visual; WC=World Cultures; WE=Writing Experience**

**Pre-Fall 2011 General Education (GE): ArtHum=Arts and Humanities; SciEng=Science and Engineering; SocSci=Social Sciences; Div=Domestic Diversity; Wrt=Writing Experience**

**Quarter Offered:** F=Fall, W=Winter, S=Spring, Su=Summer; 2017-2018 offering in parentheses

Diana Miglioretti, Ph.D., Professor  
(*Public Health Sciences*)  
Brian Moore, Ph.D., Assistant Professor  
(*Evolution and Ecology*)  
Hans-Georg Müller, M.D., Ph.D., Professor  
(*Statistics*)  
Debashis Paul, Ph.D., Associate Professor (*Statistics*)  
Jie Peng, Ph.D., Professor (*Statistics*)  
Lihong Qi, Ph.D., Associate Professor  
(*Public Health Sciences*)  
Gerald Quon, Ph.D., Assistant Professor  
(*Molecular and Cellular Biology*)  
Bruce Rannala, Ph.D., Professor  
(*Evolution and Ecology*)  
David M. Rocke, Ph.D., Professor  
(*Public Health Sciences*)  
Daniel Runcie, Ph.D., Assistant Professor  
(*Plant Sciences*)  
Daniel J. Tancredi, Ph.D., Associate Professor  
(*Pediatrics*)  
Chih-Ling Tsai, Ph.D., Professor  
(*Graduate School of Management*)  
Jane-Ling Wang, Ph.D., Professor (*Statistics*)

**Graduate Study.** Biostatistics is a field of science that uses quantitative methods to study life sciences related problems that arise in a broad array of fields. The program provides students with, first, solid training in the biostatistical core disciplines and theory; second, with state-of-the art knowledge and skills for biostatistical data analysis; third, substantial exposure to the biological and epidemiological sciences; and fourth, with a strong background in theoretical modeling, statistical techniques and quantitative as well as computational methods. Programs of study and research are offered leading to the M.S. and Ph.D. degrees. The program prepares students for interdisciplinary careers ranging from bioinformatics, environmental toxicology and stochastic modeling in biology and medicine to clinical trials, drug development, epidemiological and medical statistics. The program draws on the strengths of the Biostatistics faculty at UC Davis.

**Preparation.** Students should have one year of calculus; a course in linear algebra or one year of biological course work; facility with a programming language; and upper-division work in at least one of Mathematics, Statistics and Biology.

**Graduate Adviser.** Jie Peng (*Statistics*)

## Courses in Biostatistics (BST)

### Graduate

#### 222. Biostatistics: Survival Analysis (4)

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: Statistics 131C. Incomplete data; life tables; nonparametric methods; parametric methods; accelerated failure time models; proportional hazards models; partial likelihood; advanced topics. (Same course as Statistics 222.)—F. (S.)

#### 223. Biostatistics: Generalized Linear Models (4)

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: Statistics 131C. Likelihood and linear regression; generalized linear model; Binomial regression; case-control studies; dose-response and bioassay; Poisson regression; Gamma regression; quasi-likelihood models; estimating equations; multivariate GLMs. (Same course as Statistics 223.)—W.

#### 224. Analysis of Longitudinal Data (4)

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course/Statistics 222, 223, Statistics 232B or consent of instructor. Standard and advanced methodology, theory, algorithms, and applications relevant for analysis of repeated measurements and longitudinal data in biostatistical and statistical settings. (Same course as Statistics 224.)—S. (S.)

#### 225. Clinical Trials (4)

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course/Statistics 223 or consent of instructor. Basic statistical principles of clinical designs, including bias, randomization, blocking, and masking. Practical applications of widely-used designs, including dose-finding, comparative and

cluster randomization designs. Advanced statistical procedures for analysis of data collected in clinical trials. (Same course as Statistics 225.) Offered in alternate years.—S.

#### 226. Statistical Methods for Bioinformatics (4)

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 131C or consent of instructor; data analysis experience recommended. Standard and advanced statistical methodology, theory, algorithms, and applications relevant to the analysis of omics data. (Same course as Statistics 226.) Offered in alternate years.—(W.)

#### 252. Advanced Topics in Biostatistics (4)

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 222, 223. Biostatistical methods and models selected from the following: genetics, bioinformatics and genomics; longitudinal or functional data; clinical trials and experimental design; analysis of environmental data; dose-response, nutrition and toxicology; survival analysis; observational studies and epidemiology; computer-intensive or Bayesian methods in biostatistics. May be repeated for credit with consent of adviser when topic differs. (Same course as Statistics 252.) Offered in alternate years.—S.

#### 290. Seminar in Biostatistics (1)

Seminar—1 hour. Restricted to graduate standing. Seminar on advanced topics in the field of biostatistics. Presented by members of the Biostatistics Graduate Group and other guest speakers. May be repeated for up to 12 units of credit. (S/U grading only.)—F, W, S. (F, W, S.)

#### 298. Directed Group Study (1-5)

Prerequisite: consent of instructor.

#### 299. Special Study for Biostatistics Graduate Students (1-12)

Prerequisite: consent of instructor. (S/U grading only.)

#### 299D. Dissertation Research (1-12)

Prerequisite: advancement to Candidacy for Ph.D. and consent of instructor. Research in biostatistics under the supervision of major professor. (S/U grading only.)

## Biotechnology

(College of Agricultural and Environmental Sciences)

**Faculty.** Faculty includes members of the Departments of Animal Science, on page 162; Engineering: Chemical Engineering, on page 276; Computer Science, on page 230; Engineering: Biological and Agricultural, on page 266; Food Science and Technology, on page 340; Land, Air and Water Resources, on page 391; Plant Pathology, on page 513; Plant Sciences, on page 514; Viticulture and Enology, on page 584; and the College of Biological Sciences, on page 191.

### The Major Program

Every living organism, from the smallest and most primitive bacteria to every plant, insect, animal or human being, contains DNA as the primary genetic material. DNA directs all cellular processes, creating the incredible variety and diversity of living organisms in the biosphere. Biotechnology focuses on the mechanics of life processes and their application. Biotechnology means "life technology" and represents an integrated, multidisciplinary field, with a profound impact today on almost every aspect of human endeavor.

**Preparatory Requirements.** UC Davis students who wish to change their major to Biotechnology must complete the following courses (representing the subject areas of Biological Sciences, Chemistry, and Mathematics) with a grade point average of at least 2.500 in each subject area. All of these courses must be taken for a letter grade:

UNITS
Biological Sciences 2A, 2B, 2C ..... 15
Chemistry 2A, 2B, 2C ..... 15

Mathematics, one of the following groups: ..... 6-8  
Mathematics 16A, 16B; or Mathematics 17A, 17B; or Mathematics 21A, 21B

**The Program.** In the first two years, students develop a strong and general background in biological science with an emphasis on fundamental concepts and basic principles of genetics, molecular biology and cell biology. Four options, Animal Biotechnology, Plant Biotechnology, Fermentation/Microbial Biotechnology, and Bioinformatics, provide in-depth training and specialized knowledge in an aspect of biotechnology. Each option has a strong laboratory component to reinforce the theoretical concepts. Students also do an internship in a biotechnology company or university or government laboratory.

**Internships and Career Opportunities.** In the last decade, more industries are turning to biotechnology to solve problems and improve products, creating a growing job market for individuals trained in biotechnology in the agricultural, food and beverage, health care, chemical, pharmaceutical and biochemical, and environmental and bioremediation industries.

Graduates trained in the technologies designed for biotechnology will find their training applicable to advanced research in molecular biology, genetics, biochemistry, and the plant and animal sciences.

### B.S. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b> ..... 57-69	
Biological Sciences 2A-2B-2C..... 15	
Chemistry 2A-2B-2C..... 15	
Chemistry 8A, 8B or 118A, 118B, 118C or 128A, 128B, 128C, 129A..... 6-12	
Mathematics 16A, 16B, or 17A, 17B, or 21A, 21B ..... 6-8	
Physics 7A-7B..... 8	
Plant Sciences 120 or Statistics 100..... 4	
Biotechnology 1 ..... 4	
Select one course from:	
University Writing Program 101, 102A, 102B, 102C, 102D, 102E, 102F, 102G, 102H, 102I, 102J, 102K, 102L, 104A, 104B, 104C, 104D, 104E, 104F, 104I, 104T (may overlap with college composition requirement, may be waived by passing the upper division composition exam)	

#### Depth Subject Matter ..... 16-20

Biological Sciences 101 .....	4
Biological Sciences 104 .....	3
Molecular and Cellular Biology 121 or 161 .....	3
Biotechnology 171 .....	3
Internship or independent research; course 192 or 199 or Biotechnology 189L..... 3	
Undergraduate research proposal: Biotechnology 188 (optional) .....	3
Honors undergraduate thesis (optional) .... 1	

#### Areas of Specialization (choose one)

#### Fermentation/Microbiology Biotechnology Option ..... 38-45

Microbiology 104; Biological Sciences 102 and 103, or Animal Biology 102 and 103; Microbiology 104L or Food Science and Technology 104L; Molecular and Cellular Biology 160L or Biotechnology 161A; One of Microbiology 115, 120, 140, 150, 170, Plant Pathology 130; and a second course from the previous list or one of Biological Sciences 181, 183, Molecular and Cellular Biology 182 .....	23-30
Restricted Electives .....	15

Select from:	
Biological Sciences 132, 181, 183, Biotechnology 150, 161B, 188, Chemistry 107A, 107B, 130A, 130B, Engineering: Chemical 161C, 161L, Engineering: Computer Science 124, 129, Evolution and Ecology 100, Food Science and	

Technology 102A, 102B, 104, 104L, 110A, 110B, 123, 123L; Microbiology 105, 105L, 115, 120, 140, 150, 155L, 162, 170; Molecular and Cellular Biology 120L, 164, 182; Plant Pathology 130, 140; Plant Sciences 174, Viticulture and Enology 124, 124L, 128, 135

#### **Plant Biotechnology Option ..... 38-45**

Microbiology 101, Molecular and Cellular Biology 126, Plant Sciences 152, Biotechnology 160, 161A, 161B, Biochemistry: Biological Sciences 105; or Biological Sciences 102 and 103; or Animal Biology 102 and 103 ..... 28-35 Restricted Electives ..... 10 Select at least one course from each of the following areas:

(a) *Pests, Pathogens and Production:* Biological Sciences 181, 183, Biotechnology 150, 188, Chemistry 130A, 130B, Engineering: Computer Science 124, 129, Entomology 110, Evolution and Ecology 100, Microbiology 115, 162, Molecular and Cellular Biology 120L, 164, 182, Nematology 100 or 110, Plant Pathology 120, 123, 130, 140, Plant Biology 143, Plant Sciences 153, 154, 172, 173, 174

(b) *Growth and Development:* Biotechnology 150, 188, Chemistry 130A, 130B, Evolution and Ecology 100, Microbiology 115, Molecular and Cellular Biology 120L, Plant Biology 105, 111, 112, 113, Plant Pathology 140, Plant Sciences 100A, 100AL, 100B, 100BL, 100C, 100CL, 157, 158

#### **Animal Biotechnology Option ..... 37-45**

Microbiology 101, Animal Genetics 111, Neurobiology, Physiology, and Behavior 101, Molecular and Cellular Biology 150 or 163, 182, Animal Science 170, Biochemistry: Biological Sciences 105; or Biological Sciences 102 and 103; or Animal Biology 102 and 103 ..... 27-35 Restricted Electives ..... 10 Select at least one course from each of the following areas:

(a) *Animal Cell Biology/Microbiology/ Immunology:* Biological Sciences 183, Biotechnology 150, 161A, 161B, 188, Evolution and Ecology 100, Medical Microbiology 188, Microbiology 115, 162, Molecular and Cellular Biology 120L, 160L, Pathology, Microbiology, and Immunology 126, 126L, 127, 128, Molecular, Cellular, and Integrative Physiology 200L, Neurobiology, Physiology, and Behavior 132, Plant Pathology 140

(b) *Animal Reproduction and Breeding:* Animal Genetics 107, Animal Science 131, 140, Avian Sciences 121, Biological Sciences 181, Evolution and Ecology 102, Molecular and Cellular Biology 164, Neurobiology, Physiology, and Behavior 121, 121L, Plant Pathology 140

#### **Bioinformatics Option ..... 38-45**

Biological Sciences 180L, Biological Sciences 181 or 183, Microbiology 101, Engineering: Computer Science 20, 30, Engineering: Computer Science 124 or 129, Molecular and Cellular Biology 182, Biochemistry: Biological Sciences 105; or Biological Sciences 102 and 103; or Animal Biology 102 and 103 ..... 31-38 Restricted Electives ..... 7

Select from: Animal Genetics 212, Biological Sciences 132, 181, 183, Biotechnology 188, Engineering: Computer Science 40, 50, 60, 122A, 124, 129, 140A, 150, 154A, 166, Evolution and Ecology 100, 102, 103, Mathematics 124, Microbiology 115, Neurobiology,

Physiology, and Behavior 132, Statistics 130A, 130B, 131A, 131B, 141

#### **Total Units for the Major ..... 110-135**

**Major Adviser:** J.I. Yoder (*Plant Sciences*) in 101 Asmundson Hall

**Advising Center** for the major is located in 1220 Plant and Environmental Sciences 530-752-1715.

#### **Courses in Biotechnology (BIT)**

Courses in Biotechnology (BIT) are listed below; courses in Biotechnology; Design Emphasis (NEB) follow, see Courses in Biotechnology; Design Emphasis (NEB), on page 197.

#### **Lower Division**

##### **1Y. Introduction to Biotechnology (4)**

Lecture—2 hours; web virtual lecture—1 hour; discussion—1 hour. Principles and technologies of biotechnology as applied to agriculture, the environment, and medicine. Business plans and presentation pitches for new biotechnology products. Bioinformatics approaches exploring genomic databases and DNA manipulations in silica. GE credit: SciEng | SE. —S. (S.) Dandekar, Yoder

##### **92. Internship in Biotechnology (1-12)**

Internship—3-36 hours. Prerequisite: consent of instructor. Work experience on or off campus in subject area pertaining to biotechnology or in a business, industry or agency associated with biotechnology. Internship supervised by faculty member in the animal or plant sciences. (P/NP grading only.)

##### **99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

#### **Upper Division**

##### **150. Applied Bioinformatics (4)**

Lecture—2 hours; laboratory/discussion—2 hours. Prerequisite: Computer Science Engineering 10 or 15 or Plant Science 21; Biological Sciences 101 and 104; Plant Science 120 or Statistics 13 or Statistics 100. Limited enrollment. Concepts and programs needed to apply bioinformatics in biotechnology research. Sequence analysis and annotation and use of plant and animal databases for students in biological and agricultural sciences. Two units of credit for students who have completed Computer Science Engineering 124. GE credit: SciEng | SE, VL.—Runcie

##### **160. Principles of Plant Biotechnology (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 1A or 2A; Biological Sciences 101 or Plant Sciences 152. Principles and concepts of plant biotechnology including recombinant DNA technology, molecular biology, genomics, cell and tissue culture, gene transfer and crop improvement strategies using transgenic crops. Not open for credit to students who have completed Plant Biology 160. (Former course Plant Biology 160.) GE credit: SciEng | SE. —W. (W.) Dandekar

##### **161A. Genetics and Biotechnology Laboratory (6)**

Lecture—3 hours; laboratory—9 hours. Prerequisite: Plant Sciences 152 or Biological Sciences 101; consent of instructor. Techniques of genetic analysis at the molecular level including recombinant DNA, gene mapping and basic computational biology. Not open for credit to students who have completed Plant Biology 161A. GE credit: SciEng | SE. —W. (W.) Beckles

##### **161B. Plant Genetics and Biotechnology Laboratory (4)**

Lecture—1 hours; laboratory—8 hours. Prerequisite: Plant Sciences 152 or Biological Sciences 101; consent of instructor. Advanced techniques of genetic analysis at the molecular and cellular levels, including transformation, gene expression and analysis of transgenic plants. Not open for credit to students who have taken Plant Biology 161B. (Former course Plant Biology 161B.) GE credit: SciEng | SE, SL. —S. (S.) Bennett, Blumwald

#### **171. Professionalism and Ethics in Genomics and Biotechnology (3)**

lecture—1 hour; discussion—2 hours. Prerequisite: upper division standing in a natural science major. Real and hypothetical case studies to illustrate ethical issues in genomics and biotechnology. Training and practice in difficult ethical situations and evaluating personal and social consequences. GE credit: SciEng | SE, SL, WE. —F, W, S. (F, W, S.) Bennett, Bradford, Yoder

#### **188. Undergraduate Research Proposal (3)**

Lecture/discussion—3 hours. Prerequisite: upper division standing. Preparation and review of a scientific proposal. Problem definition, identification of objectives, literature survey, hypothesis generation, design of experiments, data analysis planning, proposal outline and preparation. (Same course as Plant Sciences 188.) GE credit: SciEng, Wrt | OL, SE, WE. —S. (S.) Kliebenstein

#### **189L. Laboratory Research in Genomics and Biotechnology (2-5)**

Laboratory—3-12 hours; discussion—1 hour. Prerequisite: course 188 and consent of instructor. Formulating experimental approaches to current questions in biotechnology; performance of proposed experiments. May be repeated for credit up to 12 units. (P/NP grading only.)

#### **192. Internship in Biotechnology (1-12)**

Internship—3-36 hours. Prerequisite: consent of instructor. Work experience on or off campus in a subject area pertaining to biotechnology or in a business, industry or agency associated with biotechnology. Internship supervised by faculty member in the animal or plant sciences. (P/NP grading only.)

#### **194H. Honors Thesis in Biotechnology (1-2)**

Independent Study—3-6 hours. Prerequisite: senior standing in Biotechnology with 3.250 GPA or higher and completion of courses 188 and 189L. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis. (Deferred grading only, pending completion of sequence.) (P/NP grading only.) GE credit: SciEng | SE, WE. —F, W, S, Su. (F, W, S, Su.) Yoder

#### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

#### **Courses in Biotechnology; Design Emphasis (NEB)**

#### **Graduate**

##### **263. Biotechnology Fundamentals and Application (2)**

Lecture—2 hours. Prerequisite: Biological Sciences 101, 102 and Microbiology 102 or consent of instructor; must be a graduate student in good standing. Fundamentals of molecular biology and chemical engineering involved in recombinant DNA technology. Topics: principles of rate processes of biological systems, optimization of bioreactors, and issues related to overexpression and production of recombinant molecules. Participation in student-directed team projects. —W. (W.) McDonald, Privalsky, Rodriguez, VanderGheynst

## **Bodega Marine Laboratory Program**

<http://bml.ucdavis.edu/>

See also Biological Sciences, *Bodega Marine Laboratory Program*, on page 192.

In 2014, the new multi-college B.S. in Marine and Coastal Science (MCS) major started and the MCS field requirement can be fulfilled by any of the courses below.

## Spring Quarter Program

A full quarter (15 units) of undergraduate course work in marine biology is available each spring quarter at the Bodega Marine Laboratory, located in Bodega Bay, California. Course offerings include lecture and laboratory instruction in the developmental biology and physiological adaptation of marine organisms, and population biology and ecology; a weekly colloquium; and an intensive individual research experience under the direction of laboratory faculty [Biological Sciences courses 122, 122P, 123; Neurobiology, Physiology, and Behavior 141, 141P]. This is a 15 unit program and course offerings and instructors may vary from year to year. Applications are due January 31.

For more course detail, see full description under appropriate academic department listing or <http://bml.ucdavis.edu/>.

## Summer Session Courses

This integrated program offers students a multidisciplinary understanding of coastal ecosystems through intensive, hands on lab and field courses taught at Bodega Marine Laboratory. Applications are due April 15.

For more course detail, see full description under appropriate academic department listing or <http://bml.ucdavis.edu/>.

Course offerings and instructors may vary from year to year.

Bodega Marine Laboratory spring and summer programs are residential, with students housed on the laboratory grounds. Participants are assessed a room and board fee in addition to standard campus registration fees. Applications and consent of instructors are required.

Additional information is available from the Biology Academic Success Center, in 1023 Sciences Laboratory Building, or directly from:

Bodega Marine Laboratory  
P.O. Box 247  
Bodega Bay, CA 94923  
707-875-2211; <http://bml.ucdavis.edu/>

## Botany

**See Plant Biology, on page 509; and Plant Biology (A Graduate Group), on page 511.**

## Business Management

**See Managerial Economics, on page 415, for undergraduate study; and Management, Graduate School of, on page 410.**

## Cantonese

**See Asian American Studies, on page 182.**

## Cell Biology

**See Molecular and Cellular Biology, on page 463.**

## Cell and Developmental Biology (A Graduate Group)

The Cell and Developmental Biology program has merged with the Biochemistry and Molecular Biology program to form Biochemistry, Molecular, Cellular, and Developmental Biology (BMCDB); see [Biochemistry, Molecular, Cellular and Developmental Biology, on page 189](#).

**Group Office.** 227B Life Sciences  
530-752-9091;  
<http://biosci3.ucdavis.edu/GradGroups/BMCDB/>

## Cell Biology and Human Anatomy

**See Medicine, School of, on page 427.**

## Chemistry

(College of Letters and Science)

**Department Administration.** For a complete list of department administration, see [http://chemistry.ucdavis.edu/homepage/department\\_administration.html](http://chemistry.ucdavis.edu/homepage/department_administration.html)

**Department Office.** 108 Chemistry Building  
530-752-8900; Fax 530-752-8995;  
<http://chemistry.ucdavis.edu>

### Faculty

James Ames, Ph.D., Professor  
Shota Atsumi, Ph.D., Associate Professor  
Matthew P. Augustine, Ph.D., Professor  
Alan L. Balch, Ph.D., Professor  
Enoch Baldwin, Ph.D., Associate Professor  
Peter Beal, Ph.D., Professor  
Louise A. Berben, Ph.D., Associate Professor  
R. David Britt, Ph.D., Professor  
William Casey, Ph.D., Professor  
Julia Chamberlain, Ph.D., Lecturer PSOE  
Xi Chen, Ph.D., Professor  
Kyle Crabtree, Ph.D., Assistant Professor  
Stephen Cramer, Ph.D., Professor  
Sheila David, Ph.D., Professor  
Davide Donadio, Ph.D., Assistant Professor  
Andrew J. Fisher, Ph.D., Professor  
Annaliese K. Franz, Ph.D., Associate Professor  
Jacquelyn Gervay Hague, Ph.D., Professor  
David Goodin, Ph.D., Professor  
Ozcan Gulacar, Ph.D., Lecturer PSOE  
Ting Guo, Ph.D., Professor  
Susan M. Kauzlarich, Ph.D., Professor  
*Distinguished Graduate Mentoring Award*  
Peter B. Kelly, Ph.D., Professor  
Kirill Kovnir, Ph.D., Assistant Professor  
Mark J. Kurth, Ph.D., Professor  
Donald P. Land, Ph.D., Professor  
Delmar Larsen, Ph.D., Associate Professor  
Carlito B. Lebrilla, Ph.D., Professor  
Gang-Yiu Liu, Ph.D., Professor  
C. William McCurdy, Ph.D., Professor  
Mark Mascali, Ph.D., Professor  
Alexandra Navrotsky, Ph.D., Professor  
Cheuk-Yiu Ng, Ph.D., Professor  
David Olson, Ph.D., Assistant Professor  
Frank Osterloh, Ph.D., Professor  
Philip P. Power, FRS, Ph.D., Professor  
Neil E. Schore, Ph.D., Professor

*Academic Senate Distinguished Teaching Award*  
Jared T. Shaw, Ph.D., Professor  
Justin Siegel, Ph.D., Assistant Professor  
Alexei P. Stuchebrukhov, Ph.D., Professor  
Dean Tantillo, Ph.D., Professor  
*Academic Senate Distinguished Teaching Award*

Michael Toney, Ph.D., Professor  
Lee-Ping Wang, Ph.D., Assistant Professor

### Emeriti Faculty

Thomas L. Allen, Ph.D., Professor Emeritus  
W. Ronald Fawcett, Ph.D., Professor Emeritus  
William H. Fink, Ph.D., Professor, Emeritus  
Edwin Friedrich, Ph.D., Professor Emeritus  
Hakon Hope, Cand. Real., Professor Emeritus  
William M. Jackson, Ph.D., Professor Emeritus  
Gerd N. LaMar, Ph.D., Professor Emeritus  
Claude F. Meares, Ph.D., Professor Emeritus  
W. Kenneth Musker, Ph.D., Professor Emeritus  
Marilyn Olmstead, Ph.D., Professor  
Krishnan P. Nambiar, Ph.D., Associate Professor  
*Distinguished Graduate Mentoring Award*  
Carl W. Schmid, Ph.D., Professor, Emeritus  
James H. Swinehart, Ph.D., Professor Emeritus  
Dino S. Tinti, Ph.D., Professor, Emeritus  
Nancy S. True, Ph.D., Professor Emeritus  
George S. Zweifel, Sc.D., Professor Emeritus

### Affiliated Faculty

Toby Allen, Ph.D., Associate Professor  
Giulia Galli, Ph.D., Adjunct Professor

### The Major Programs

Chemistry studies the composition of matter, its structure, and the means by which it is converted from one form to another.

**The Program.** The Department of Chemistry offers several degree programs leading to the Bachelor of Arts and the Bachelor of Science. The curriculum leading to the A.B. degree offers a substantive program in chemistry while allowing students the freedom to take more courses in other disciplines and pursue a broad liberal arts education. Students who have a deeper interest in chemistry normally elect one of the several programs leading to the B.S. degree. The standard B.S. program, the only chemistry program accredited by the American Chemical Society, is appropriate for students who are interested in chemistry as a profession. The B.S. in Chemical Physics, the B.S. in Pharmaceutical Chemistry, and the two B.S. Applied Chemistry emphases are slightly less intense in chemistry, and draw on significant course materials from areas relevant to their particular focus but outside of a classical chemistry degree. Students following the A.B. or one of the B.S. programs may consider taking advantage of the Education Abroad Program. Our major adviser can assist students in planning a curriculum while abroad that assures regular progress in the major. A minor program in chemistry is also available.

**Career Alternatives.** Chemistry graduates with bachelor's degrees are employed extensively throughout various industries in quality control, research and development, production supervision, technical marketing, and other areas. The types of industries employing these graduates include chemical, energy, pharmaceutical, genetic engineering, biotechnology, food and beverage, petroleum and petrochemical, paper and textile, electronics and computer, and environmental and regulatory agencies. The bachelor's programs also provide chemistry graduates with the rigorous preparation needed for an advanced degree in chemistry and various professional schools in the health sciences.

### Chemistry

#### A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter .....</b>	<b>36-42</b>
Chemistry 2A-2B-2C or 2AH-2BH-2CH ... 15	
Physics 7A-7B-7C or 9A-9B-9C ..... 12-15	
Mathematics 16A-16B-16C or 17A-17B-17C or 21A-21B-21C ..... 9-12	
<b>Depth Subject Matter .....</b>	<b>43</b>
Chemistry 105, 110A-110B-110C, 124A, 128A-128B-128C-129A-129B ..... 32	
At least 11 additional upper division units in chemistry (except Chemistry 107A or 107B) or related areas, including one course with	

formal lectures. Courses in related areas must be approved in advance by the major adviser.....11  
**Total Units for the Major** ..... **79-85**

## Chemistry

### American Chemical Society Accredited Program

#### B.S. Major Requirements:

UNITS

##### **Preparatory Subject Matter** ..... **53**

Chemistry 2A-2B-2C or 2AH-2BH-2CH ... 15  
 Physics 9A, 9B, 9C ..... 15  
 Mathematics 21A, 21B, 21C, 21D, 22A,  
 22AL, 22B ..... 23

##### **Depth Subject Matter** ..... **54**

Chemistry 105, 108, 110A, 110B, 110C,  
 115, 124A, 124B or 124C, 124L, 125,  
 128A, 128B, 128C, 129A, 129B,  
 129C ..... 50  
 At least four additional upper-division units  
 in chemistry (except Chemistry 107A,  
 107B) ..... 4

##### **Total Units for the Major** ..... **107**

#### Recommended

Physics 9D

## Chemistry

### Environmental Chemistry emphasis

#### B.S. Major Requirements:

UNITS

##### **Preparatory Subject Matter** ..... **43-50**

Chemistry 2A-2B-2C or 2AH-2BH-2CH ... 15  
 Physics 7A, 7B, 7C or 9A-9B-9C ..... 12-15  
 Mathematics 16A-16B-16C or 17A-17B-17C  
 or 21A-21B-21C ..... 9-12  
 Biological Sciences 2A ..... 4  
 Statistics 13 or 32 or 100 ..... 3-4

##### **Depth Subject Matter** ..... **53-62**

Chemistry 100, 105, 115, 124A ..... 14  
 Chemistry 107A-107B or  
 110A-110B-110C ..... 6-12  
 Chemistry 118A-118B-118C or 128A-128B-  
 128C-129A-129B ..... 12-13  
 Environmental Science and Policy 110 ..... 4  
 Environmental Toxicology 101 ..... 4  
 At least three courses from: Atmospheric  
 Science 160; Environmental Science and  
 Policy 151; Environmental Toxicology 102A,  
 102B, 120, 131, 135, 146; Geology 150A;  
 Soil Science 111 ..... 9-13  
 At least three additional upper division units  
 in chemistry (Chemistry 199 or 194H strongly  
 encouraged) ..... 3

##### **Total Units for the Major** ..... **95-113**

## Chemistry

### Forensic Chemistry Emphasis:

#### B.S. Major Requirements:

UNITS

##### **Preparatory Subject Matter** ..... **47-54**

Chemistry 2A-2B-2C or 2AH-2BH-2CH ... 15  
 Physics 7A-7B-7C or 9A-9B-9C ..... 12-15  
 Mathematics 16A-16B-16C or 17A-17B-17C  
 or 21A-21B-21C ..... 9-12  
 Biological Sciences 2A ..... 4  
 Environmental Toxicology 20 ..... 4  
 Statistics 13, 32, 100 or 102 ..... 3-4

##### **Depth Subject Matter** ..... **51-61**

Chemistry 104, 105, 115 ..... 11  
 Chemistry 107A-107B or  
 110A-110B-110C ..... 6-12  
 Chemistry 118A-118B-118C or 128A-128B-  
 128C-129A-129B ..... 12-13  
 Environmental Toxicology 101, 102A,  
 102B ..... 13

At least two courses from: Biological Sciences  
 101; Environmental Science and Policy 161;  
 Environmental Toxicology 103A, 103B, 111,  
 135, 138; Statistics 108, 130A ..... 6-9  
 At least three additional upper division units  
 in chemistry (Chemistry 199 or 194H strongly  
 encouraged) ..... 3

##### **Total Units for the Major** ..... **98-115**

## Chemical Physics

#### B.S. Major Requirements:

UNITS

##### **Preparatory Subject Matter** ..... **57**

Chemistry 2A-2B-2C or  
 2AH-2BH-2CH ..... 15  
 Physics 9A, 9B, 9C, 9D ..... 19  
 Mathematics 21A, 21B, 21C, 21D, 22A,  
 22AL, 22B ..... 23

##### **Depth Subject Matter** ..... **53**

Chemistry 105, 110A, 110B, 110C, 115,  
 124A, 125, 128A, 128B, 129A ..... 35  
 Physics 104A, 105A, 110A ..... 12  
 At least one course from: Physics 105B,  
 110B, 112, 115A, 140A ..... 4  
 At least two additional upper division units in  
 chemistry (except Chemistry 107A,  
 107B) ..... 2

##### **Total Units for the Major** ..... **110**

## Pharmaceutical Chemistry

#### B.S. Major Requirements:

UNITS

##### **Preparatory Subject Matter** ..... **48-55**

Chemistry 2A-2B-2C or 2AH-2BH-2CH ... 15  
 Physics 7A, 7B, 7C or 9A-9B-9C ..... 12-15  
 Mathematics 16A-16B-16C or 17A-17B-17C  
 or 21A-21B-21C ..... 9-12  
 Biological Sciences 2A, and 2B or 2C ..... 9  
 Statistics 13, 32 or 100 ..... 3-4

##### **Depth Subject Matter** ..... **48-64**

Chemistry 124A, 130A-130B-135,  
 150 ..... 15  
 Chemistry 107A-107B or  
 110A-110B-110C ..... 6-12  
 Chemistry 118A-118B-118C or 128A-  
 128B-128C-129A-129B-129C ..... 12-15  
 Biological Sciences 102 or Chemistry  
 131 ..... 3  
 At least four courses (not used to satisfy the  
 above requirements) from: Biological  
 Sciences 102, 103, Biotechnology 171 or  
 Veterinary Medicine 170, Chemistry 131,  
 199 (minimum 3 units) or 194H,  
 Environmental Toxicology 103A,  
 Microbiology 104, Neurobiology,  
 Physiology, and Behavior 100, 101, Plant  
 Biology 126 ..... 12-19

##### **Total Units for the Major** ..... **96-119**

**Major Adviser.** To contact a major adviser in  
 the Department of Chemistry, see [http://chemistry.ucdavis.edu/undergraduate/contact\\_undergraduate\\_affairs.html](http://chemistry.ucdavis.edu/undergraduate/contact_undergraduate_affairs.html).

## Minor Program Requirements:

UNITS

##### **Chemistry** ..... **20-21**

Chemistry 105, 107A, 107B, 118A,  
 124A ..... 17  
 At least one additional course from:  
 Chemistry 118B, 124B and 124C ..... 3-4

Note: The minor program has prerequisites of Chemistry 2A-2B-2C, Mathematics 16A-16B-16C, and Physics 7A-7B-7C or their equivalents. Students wishing to earn a Chemistry minor should consult with a Chemistry major adviser.

**Honors and Honors Program.** The student must take courses 194HA, 194HB, and 194HC.

**Graduate Study.** The Department of Chemistry  
 offers programs of study and research leading to the

M.S. and Ph.D. degrees in Chemistry. Detailed information regarding graduate study may be obtained by contacting the Graduate Adviser, Department of Chemistry. See also [Graduate Studies](#), on page 120.

## Courses in Chemistry (CHE)

**Chemistry Placement Requirement.** Students who enroll in Chemistry 2A, 2AH or Workload Chemistry 41C must satisfy the Chemistry Placement Requirement. See the Department of Chemistry website at [http://chemistry.ucdavis.edu/undergraduate/chemistry\\_placement\\_exam.html](http://chemistry.ucdavis.edu/undergraduate/chemistry_placement_exam.html) well in advance of enrolling in these general chemistry courses for further details about the placement requirements. Students who do not meet the placement requirements will be administratively dropped from these Chemistry courses.

## The Student Academic Success Center (SASC)

(SASC) provides review materials, workshops, drop-in and group tutoring, and additional resources.

**Chemistry Graduate Students Tutors** are also listed on the Department of Chemistry website at [http://chemistry.ucdavis.edu/undergraduate/tutors\\_in\\_chemistry.html](http://chemistry.ucdavis.edu/undergraduate/tutors_in_chemistry.html).

## Lower Division

### 2A. General Chemistry (5)

Lecture—3 hours; laboratory/discussion—4 hours. Prerequisite: high school chemistry and physics strongly recommended; any one of the following: (A) SAT Mathematics score = 600+; (B) ACT Mathematics score = 27+; (C) AP Chemistry exam score of = 3+; (D) SAT Chemistry subject test score = 700+; (E) UC Davis Chemistry Placement Examination score = 24+ on first attempt; in lieu of A-E, either completion of ALEKS online Preparatory Chemistry course with 100% Pie Mastery or completion of Workload 41C with a grade of C or better (offered only in fall quarter to students who do not meet A-E). Periodic table, stoichiometry, chemical equations, physical properties and kinetic theory of gases, atomic and molecular structure and chemical bonding. Laboratory experiments in stoichiometric relations, properties and collection of gases, atomic spectroscopy, and introductory quantitative analysis. Not open for credit to students who have taken course 2AH. GE credit: SciEng | QL, SE, SL.—F, W. (F, W.)

### 2AH. Honors General Chemistry (5)

Lecture—3 hours; laboratory/discussion—4 hours. Prerequisite: high school chemistry and physics. Any ONE of the following: (A) SAT Mathematics score = 670+; (B) ACT Mathematics score = 30+; (C) AP Chemistry exam score = 4+; (D) SAT Chemistry subject test score = 700+; (E) UC Davis Chemistry Placement Examination score = 33+ on first attempt; (F) UC Davis Chemistry Placement Examination score = 30+ AND UC Davis Mathematics Placement Examination score = 45+, both on first attempts; consent of instructor. Limited enrollment course with a more rigorous treatment of material covered in course 2A. Students completing course 2AH can continue with course 2BH or 2B. Not open for credit to students who have taken course 2A. GE credit: SciEng | QL, SE, SL.—F. (F.)

### 2B. General Chemistry (5)

Lecture—3 hours; laboratory/discussion—4 hours. Prerequisite: C- or better in course 2A or 2AH. Continuation of course 2A. Condensed phases and intermolecular forces, chemical thermodynamics, chemical equilibria, acids and bases, solubility. Laboratory experiments in thermochemistry, equilibria, and quantitative analysis using volumetric methods. Not open for credit to students who have taken course 2B. GE credit: SciEng | QL, SE, SL.—W, S. (W, S.)

### 2BH. Honors General Chemistry (5)

Lecture—3 hours; laboratory/discussion—4 hours. Prerequisite: course 2A with consent of instructor or course 2AH with a grade C or better; and Mathematics 21B (may be taken concurrently) or consent of instructor. Limited enrollment course with a more rigorous treatment of material covered in course 2B.

Students completing course 2BH can continue with course 2CH or 2C. GE credit: SciEng | QL, SE, SL.—W. (W.)

### **2C. General Chemistry (5)**

Lecture—3 hours; laboratory/discussion—4 hours. Prerequisite: C- or better in course 2B or 2BH. Kinetics, electrochemistry, spectroscopy, structure and bonding in transition metal compounds, application of principles to chemical reactions. Laboratory experiments in selected analytical methods and syntheses. Not open for credit to students who have taken course 2CH. GE credit: SciEng | QL, SE, SL.—F, S. (F, S.)

### **2CH. Honors General Chemistry (5)**

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2B with consent of instructor or course 2BH with a grade of C or better; Mathematics 21C (may be taken concurrently) or consent of instructor. Limited enrollment course with a more rigorous treatment of material covered in course 2C. Not open for credit to students who have taken course 2C. GE credit: SciEng | QL, SE, SL.—S. (S.)

### **3A. Chemistry for Life Sciences: Determining Structure and Predicting Properties (5)**

Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: high school chemistry and physics strongly recommended; satisfactory score on the Chemistry and Mathematics Placement Examinations or satisfactory completion of the ALEKS Summer Chemistry Prep Course; a satisfactory grade in Workload 41C ('P' or 'C' or better) will suffice in lieu of a satisfactory Chemistry Placement Examination score. Concurrent enrollment with course 2A, 2B, 2C, 2AH, 2BH, 2CH prohibited; not open for enrollment to students who have completed CHE 2C or 2CH with a C- or better. Integrated General and Organic Chemistry intended for majors in the life sciences. Core concepts of chemical composition, structure and properties. Includes phase changes, separation methods, composition, spectroscopy, atomic and molecular structure, periodicity, bonding, charge distribution, intermolecular forces, and physical properties. Only 3 units credit for students who have completed course 2A or 2AH with a C- or better; only 1 unit of credit to students who have completed course 2B or CHE 2BH with a C- or better. GE credit: SciEng | QL, SE, SL.—F, W. (F, W.)

### **3B. Chemistry for Life Sciences: Predicting and Characterizing Chemical Change (5)**

Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: C- or better in course 3A; note: C- or better in course 2A or 2AH does not satisfy the prerequisite requirement. Concurrent enrollment with course 2A, 2B, 2C, 2AH, 2BH, 2CH prohibited. Continuation of course 3A covering core concepts of characterization of chemical processes and predicting chemical changes. Includes modeling chemical reactions, understanding proportions/stoichiometry, tracking energy, activation energy, reaction kinetics, thermodynamics, and equilibrium. Only 3 units credit for students who have completed course 2B or 2BH with a C- or better. GE credit: SciEng | QL, SE, SL.—W. (W.)

### **3C. Chemistry for Life Sciences: Controlling Processes and Synthetic Pathways (5)**

Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: C- or better in course 3B; note: C- or better in course 2B or 2BH does not satisfy the prerequisite requirement. Concurrent enrollment with course 2A, 2B, 2C, 2AH, 2BH, 2CH prohibited. Continuation of course 3B covering core concepts of harnessing energy, controlling reaction extent, and organic chemistry synthetic pathways. Includes acids and bases, thermodynamics, chemical equilibria, organic chemistry terminology and mechanisms. Only 3 units credit for students who have completed course 2C or 2CH with a C- or better. GE credit: SciEng | QL, SE, SL.—S. (S.)

### **8A. Organic Chemistry: Brief Course (2)**

Lecture—2 hours. Prerequisite: C- or better in course 2B or 2BH. With course 8B, an introduction to the nomenclature, structure, chemistry, and reaction mechanisms of organic compounds. Intended for stu-

dents majoring in areas other than organic chemistry. No credit to students who have completed courses 118A or 128A. GE credit: SciEng | SE.—F, S. (F, S.)

### **8B. Organic Chemistry: Brief Course (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 8A, 118A, or 128A. Laboratory concerned primarily with organic laboratory techniques and the chemistry of the common classes of organic compounds. Lecture portion a continuation of course 8A. Varying credit hours according to courses taken previously and corresponding expected workload for this course; full credit to students who complete course 118A or 128A; 3 units credit to students who have completed courses 128A and 129A (students who have completed course 129A are exempt from the laboratory portion of course 8B); 2 units credit to students who have completed 128B; 1 unit credit to students who have completed course 118B or courses 128B and 129A (students who have completed course 118B are exempt from the laboratory portion of course 8B). GE credit: SciEng | SE.—F, W. (F, W.)

### **10. Concepts of Chemistry (4)**

Lecture—4 hours. Survey of basic concepts and contemporary applications of chemistry. Designed for non-science majors and not as preparation for Chemistry 2A. Not open for credit to students who have had Chemistry 2A; but students with credit for course 10 may take Chemistry 2A for full credit. GE credit: SciEng, Wrt | SE, SL.—F. (F.)

### **98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

### **99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

## **Upper Division**

### **100. Environmental Water Chemistry (3)**

Lecture—3 hours. Prerequisite: course 2C or 2CH. Practical aspects of water chemistry in the environment, including thermodynamic relations, coordination chemistry, solubility calculations, redox reactions and rate laws. Computer modeling of the evolution in water chemistry from contact with minerals and gases.—W. (W.) Casey

### **104. Forensic Applications of Analytical Chemistry (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 2C or 2CH. Theory and application of standard methods of chemical analysis to evidentiary samples. Use and evaluation of results from screening tests, FTIR, GC and GCMS to various sample types encountered in forensics.—F. (F.) Land

### **105. Analytical and Physical Chemical Methods (4)**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 110A (may be taken concurrently) or course 107B (may be taken concurrently). Fundamental theory and laboratory techniques in analytical and physical chemistry. Errors and data analysis methods. Basic electrical circuits in instruments. Advanced solution equilibria. Potentiometric analysis. Chromatographic separations. UV-visible spectroscopy. Lasers. GE credit: SciEng | QL, SE.—F, S. (F, S.)

### **107A. Physical Chemistry for the Life Sciences (3)**

Lecture—3 hours. Prerequisite: course 2C, Mathematics 16C or 21C, one year of college level physics. Physical chemistry intended for majors in the life science area. Introductory development of classical and statistical thermodynamics including equilibrium processes and solutions of both non-electrolytes and electrolytes. The thermodynamic basis of electrochemistry and membrane potentials.—F. (F.)

### **107B. Physical Chemistry for the Life Sciences (3)**

Lecture—3 hours. Prerequisite: course 107A. Continuation of course 107A. Continuation of course 107A. Kinetic theory of gases and transport processes in liquids. Chemical kinetics, enzyme kinetics

and theories of reaction rates. Introduction to quantum theory, atomic and molecular structure, and spectroscopy. Application to problems in the biological sciences. GE credit: SciEng | SE.—W, S. (W, S.)

### **108. Molecular Biochemistry (3)**

Lecture—3 hours. Prerequisite: course 118C or 128C. Pass One open to Chemistry majors. Chemical principles and experimental methods applied to the biological sciences to understand the molecular structure and function of proteins, nucleic acids, carbohydrates, and membrane lipids.—S. (S.) Ames, Fisher

### **110A. Physical Chemistry: Introduction to Quantum Mechanics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2C, Mathematics 16C or 21C; one year of college physics. Introduction to the postulates and general principles of quantum mechanics. Approximations based on variational method and time independent perturbation theory. Application to harmonic oscillator, rigid rotor, one-electron and many-electron atoms, and homo- and hetero-nuclear diatomic molecules. GE credit: SciEng | QL, SE.—F, S. (F, W.)

### **110B. Physical Chemistry: Properties of Atoms and Molecules (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110A. Group theory. Application of quantum mechanics to polyatomic molecules and molecular spectroscopy. Intermolecular forces and the gas, liquid and solid states. Distributions, ensembles and partition functions. Transport properties.—F, W. (F, W.)

### **110C. Physical Chemistry: Thermodynamics, Equilibria and Kinetics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110B. Development and application of the general principles of thermodynamics and statistical thermodynamics. Chemical kinetics, rate laws for chemical reactions and reaction mechanisms.—F, S. (F, S.)

### **115. Instrumental Analysis (4)**

Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 105 and 110B (may be taken concurrently) or 107A-107B. Intermediate theory and laboratory techniques in analytical and physical chemistry. Advanced data analysis methods and goodness-of-fit criteria. Fouriertransform spectroscopic methods and instrumentation. Mass spectrometry. Electrochemistry. Liquid chromatography. GE credit: SciEng, Wrt | QL, SE, WE.—F, W. (F, W.)

### **118A. Organic Chemistry for Health and Life Sciences (4)**

Lecture—3 hours; laboratory/discussion—1.5 hours. Prerequisite: course 2C or 2CH with a grade C- or higher. The 118A, 118B, 118C series is for students planning professional school studies in health and life sciences. A rigorous, in-depth presentation of basic principles with emphasis on stereochemistry and spectroscopy and preparations and reactions of nonaromatic hydrocarbons, haloalkanes, alcohols and ethers.—F, W, S. (F, W, S.)

### **118B. Organic Chemistry for Health and Life Sciences (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 118A or 128A. Continuation of course 118A, with emphasis on spectroscopy and the preparation and reactions of aromatic hydrocarbons, organometallic compounds, aldehydes and ketones.—F, W, S. (F, W, S.)

### **118C. Organic Chemistry for Health and Life Sciences (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 118B or courses 128B and 129A. Open to students changing from the Chemistry 128 course sequence only if they have completed prior organic laboratory work (at least course Chemistry 129A). Continuation of course 118B, with emphasis on the preparation, reactions and identification of carboxylic acids and their derivatives, alkyl and acyl

amines,  $\beta$ -dicarbonyl compounds, and various classes of naturally occurring, biologically important compounds.—F, W, S. (F, W, S.)

### **121. Introduction to Molecular Structure and Spectra (4)**

Lecture—4 hours. Prerequisite: course 110B. Modern theoretical and experimental methods used to study problems of molecular structure and bonding; emphasis on spectroscopic techniques.—S. (S.)

### **122. Chemistry of Nanoparticles (3)**

Lecture—3 hours. Prerequisite: course 110C (may be taken concurrently) or 107B (may be taken concurrently). Chemical and physical aspects of inorganic nanoparticles. Topics include synthesis, structure, colloidal behavior, catalytic activity, size and shape dependency of physical properties, analytical methods and applications.—S. (S.) Osterloh

### **124A. Inorganic Chemistry: Fundamentals (3)**

Lecture—3 hours. Prerequisite: course 2C or course 2CH. Symmetry, molecular geometry and structure, molecular orbital theory of bonding (polyatomic molecules and transition metals), solid state chemistry, energetics and spectroscopy of inorganic compounds. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

### **124B. Inorganic Chemistry: Main Group Elements (3)**

Lecture—3 hours. Prerequisite: course 124A. Synthesis, structure and reactivity of inorganic and hetero-organic molecules containing the main group elements.—W. (W.)

### **124C. Inorganic Chemistry: d and f Block Elements (3)**

Lecture—3 hours. Prerequisite: course 124A. Synthesis, structure and reactivity of transition metal complexes, organometallic and bioinorganic chemistry, the lanthanides and actinides.—S. (S.)

### **124L. Laboratory Methods in Inorganic Chemistry (2)**

Laboratory—6 hours. Prerequisite: course 124B or 124C (may be taken concurrently). The preparation, purification and characterization of main group and transition metal inorganic and organometallic compounds.—S. (S.)

### **125. Advanced Methods in Physical Chemistry (4)**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 110C (may be taken concurrently) and 115. Advanced theory and laboratory techniques in analytical and physical chemistry. Advanced spectroscopic methods. Thermodynamics. Kinetics. Chemical literature. Digital electronics and computer interfacing. Laboratory measurements and vacuum techniques. GE credit: SciEng, Wrt | QL, SE, WE.—F, S. (F, S.)

### **128A. Organic Chemistry (3)**

Lecture—3 hours. Prerequisite: course 2C with a grade of C or higher; chemistry majors should enroll in course 129A concurrently. Introduction to the basic concepts of organic chemistry with emphasis on stereochemistry and the chemistry of hydrocarbons. Designed primarily for majors in chemistry.—F, W. (F, W.)

### **128B. Organic Chemistry (3)**

Lecture—3 hours. Prerequisite: course 128A or consent of instructor, course 129A strongly recommended; chemistry majors should enroll in course 129B concurrently. Continuation of course 128A with emphasis on aromatic and aliphatic substitution reactions, elimination reactions, and the chemistry of carbonyl compounds. Introduction to the application of spectroscopic methods to organic chemistry.—F, S. (F, S.)

### **128C. Organic Chemistry (3)**

Lecture—3 hours. Prerequisite: course 128B, chemistry majors should enroll in course 129C concurrently. Continuation of course 128B with emphasis on enolate condensations and the chemistry of amines, phenols, and sugars; selected biologically important compounds.—F, S. (F, S.)

### **129A. Organic Chemistry Laboratory (2)**

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 2C with a grade of C or higher; course 128A (may be taken concurrently). Introduction to laboratory techniques of organic chemistry. Emphasis is on methods used for separation and purification of organic compounds.—F, W. (F, W.)

### **129B. Organic Chemistry Laboratory (2)**

Laboratory—6 hours. Prerequisite: courses 128B (may be taken concurrently) and 129A. Continuation of course 129A. Emphasis is on methods used for synthesis and isolation of organic compounds.—F, S. (F, S.)

### **129C. Organic Chemistry Laboratory (2)**

Laboratory—6 hours. Prerequisite: courses 128C (may be taken concurrently) and 129B. Continuation of course 129B.—F, S. (F, S.)

### **130A. Pharmaceutical Chemistry (3)**

Lecture—3 hours. Prerequisite: course 118C or 128C. Examination of the design principles and experimental methods used in pharmaceutical and medicinal chemistry.—W. (W.)

### **130B. Pharmaceutical Chemistry (3)**

Lecture—2 hours; lecture/laboratory—1 hours. Prerequisite: course 130A. Continuation of course 130A with emphasis on case studies of various drugs and the use of computational methods in drug design.—S. (S.)

### **130C. Case Studies in Pharmaceutical Chemistry (1)**

Seminar—2 hours; independent study. Prerequisite: courses 130A and 130B concurrently. Seminar. Exploration of medicinal and pharmaceutical chemistry topics through seminars presented by professional chemists (and allied professionals). Designed to highlight career opportunities for students with a degree in pharmaceutical chemistry. (P/NP grading only.)—S. (S.)

### **131. Modern Methods of Organic Synthesis (3)**

Lecture—3 hours. Prerequisite: course 118C or 128C. Introduction to modern synthetic methodology in organic chemistry with emphasis on retrosynthetic analysis, reaction mechanisms, and application to multistep syntheses of pharmaceuticals and natural products. GE credit: SciEng | SE.—F. (F.)

### **135. Advanced Bio-organic Chemistry Laboratory (3)**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 118C or 129C. Separation, purification, identification and biological evaluation of organic compounds using modern methods of synthesis, computational chemistry and instrumentation. Emphasis on pharmaceutical and medicinal substances.—F, S. (F, S.)

### **145. Good Quality Practices (3)**

Discussion—1 hour; laboratory—6 hours. Prerequisite: course 129B or 118B. Open to Chemistry and science majors. Preparation for work in GQP laboratories in both research and industry. Context within GQP: Good Quality Practices (GMP Good Manufacturing Practice, GCP Good Clinical Practices). Lab practice in GQP skills. GE credit: SciEng | SE.—W, S. (W, S.)

### **150. Chemistry of Natural Products (3)**

Lecture—3 hours. Prerequisite: course 128C. Chemistry of terpenes, steroids, acetogenins, and alkaloids: isolation, structure determination, biosynthesis, chemical transformations, and total synthesis. GE credit: SciEng, Wrt | SE, WE.—S. (S.)

### **192. Internship in Chemistry (1-6)**

Internship—3-18 hours. Prerequisite: upper division standing; project approval by faculty sponsor prior to enrollment. Supervised internship in chemistry; requires a final written report. May be repeated for credit for a total of 6 units. (P/NP grading only.)

### **194HA. Undergraduate Honors Research (2)**

Independent study—2 hours. Prerequisite: open only to chemistry majors who have completed 135 units and who qualify for the honors program. Original

research under the guidance of a faculty adviser, culminating in the writing of an extensive report. (Deferred grading only, pending completion of sequence.)—F, W, S. (F, W, S.)

### **194HB. Undergraduate Honors Research (2)**

Independent study—2 hours. Prerequisite: open only to chemistry majors who have completed 135 units and who qualify for the honors program. Original research under the guidance of a faculty adviser, culminating in the writing of an extensive report. (Deferred grading only, pending completion of sequence.)—F, W, S. (F, W, S.)

### **194HC. Undergraduate Honors Research (2)**

Independent study—2 hours. Prerequisite: open only to chemistry majors who have completed 135 units and who qualify for the honors program. Original research under the guidance of a faculty adviser, culminating in the writing of an extensive report. (Deferred grading only, pending completion of sequence.)—F, W, S. (F, W, S.)

### **195. Careers in Chemistry (1)**

Seminar—2 hours. Prerequisite: junior or senior standing in Chemistry. Designed to give Chemistry undergraduate students an in-depth appreciation of career opportunities with a bachelors degree in chemistry. Professional chemists (and allied professionals) describe research and provide career insights. (P/NP grading only.)—F.

### **197. Projects in Chemical Education (1-4)**

Discussion and/or laboratory. Prerequisite: consent of instructor. Participation may include development of laboratory experiments, lecture demonstrations, autotutorial modules or assistance with laboratory sessions. May be repeated for credit for a total of 12 units. (P/NP grading only.)—F, W, S. (F, W, S.)

### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor based upon adequate preparation in chemistry, mathematics and physics. (P/NP grading only.)

### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor based upon adequate preparation in chemistry, mathematics, and physics. (P/NP grading only.)

### **Graduate**

### **201. Chemical Uses of Symmetry and Group Theory (3)**

Lecture—3 hours. Prerequisite: course 124A and 110B, or consent of instructor. Symmetry elements and operations, point groups, representations of groups. Applications to molecular orbital theory, ligand field theory, molecular vibrations, and angular momentum. Crystallographic symmetry.—F. (F.)

### **204. Mathematical Methods in Chemistry (3)**

Lecture—3 hours. Prerequisite: course 110C. Graduate standing in Chemistry. Introduction to mathematical and numerical methods in chemistry. Real and complex functions. Methods of integration. Differential equations. Linear algebra and matrices. Special functions. Integral transforms. Statistics.—F. (F.)

### **205. Symmetry, Spectroscopy, and Structure (3)**

Lecture—3 hours. Prerequisite: course 201 or the equivalent. Vibrational and rotational spectra; electronic spectra and photoelectron spectroscopy; magnetism; electron spin and nuclear quadrupole resonance spectroscopy; nuclear magnetic resonance spectroscopy; other spectroscopic methods.—W. (W.)

### **209. Special Topics in Physical Chemistry (3)**

Lecture—3 hours. Prerequisite: courses 210A and 211A. Graduate standing in Chemistry. Advanced topics in physical chemistry, biophysical chemistry or chemical physics chosen from areas of current research interest. May be repeated for credit when topic differs. Offered irregularly.

**210A. Quantum Chemistry: Introduction and Stationary-State Properties (3)**

Lecture—3 hours. Prerequisite: course 110B and 110C or consent of instructor. Stationary-state quantum chemistry: postulates of quantum mechanics, simple solutions, central field problems and angular momenta, hydrogen atom, perturbation theory, variational theory, atoms and molecules. —W. (W.)

**210B. Quantum Chemistry: Time-Dependent Systems (3)**

Lecture—3 hours. Prerequisite: course 210A. Matrix mechanics and time-dependent quantum chemistry: matrix formulation of quantum mechanics, Heisenberg representation, time-dependent perturbation theory, selection rules, density matrices, and miscellaneous molecular properties. —S. (S.)

**210C. Quantum Chemistry: Molecular Spectroscopy (3)**

Lecture—3 hours. Prerequisite: course 210B. Molecular spectroscopy: Born-Oppenheimer approximation, rotational, vibrational and electronic spectroscopy, spin systems, and molecular photo-physics. —F. (F.)

**211A. Advanced Physical Chemistry: Statistical Thermodynamics (3)**

Lecture—3 hours. Prerequisite: consent of instructor. Principles and applications of statistical mechanics; ensemble theory; statistical thermodynamics of gases, solids, liquids, electrolyte solutions and polymers; chemical equilibrium. —F. (F.)

**211B. Statistical Mechanics (3)**

Lecture—3 hours. Prerequisite: course 211A. Statistical mechanics of nonequilibrium systems, including the rigorous kinetic theory of gases, continuum mechanics transport in dense fluids, stochastic processes, brownian motion and linear response theory. Offered in alternate years. —W.

**212. Chemical Dynamics (3)**

Lecture—3 hours. Prerequisite: consent of instructor. Introduction to modern concepts in chemical reaction dynamics for graduate students in chemistry. Emphasis will be placed on experimental techniques as well as emerging physical models for characterizing chemical reactivity at a microscopic level. Offered in alternate years. —W.

**215. Theoretical and Computational Chemistry (3)**

Lecture—3 hours. Prerequisite: courses 211A and 210B or consent of instructor. Mathematics of wide utility in chemistry, computational methods for guidance or alternative to experiment, and modern formulations of chemical theory. Emphasis will vary in successive years. May be repeated for credit when topic differs. Offered in alternate years. —(S.)

**216. Magnetic Resonance Spectroscopy (3)**

Lecture—3 hours. Prerequisite: courses 210A, 210B (may be taken concurrently). Quantum mechanics of spin and orbital angular momentum, nuclear magnetic resonance, theory of chemical shift and multiplet structures, electron spin resonance, theory of g-tensor in organic and transition ions, spin Hamiltonians, nuclear quadrupolar resonance, spin relaxation processes. Offered in alternate years. —(S.)

**217. X-Ray Structure Determination (3)**

Lecture—3 hours. Prerequisite: consent of instructor. Introduction to x-ray structure determination; crystals, symmetry, diffraction geometry, sample preparation and handling, diffraction apparatus and data collection, methods of structure solution and refinement, presentation of results, text, tables and graphics, crystallographic literature. —S. (S.)

**218. Macromolecules: Physical Principles (3)**

Lecture—3 hours. Prerequisite: courses 110A, 110B, 110C or the equivalent. Relationship of higher order macromolecular structure to subunit composition; equilibrium properties and macromolecular dynamics; physical chemical determination of macromolecular structure. Offered in alternate years. —F.

**219. Spectroscopy of Organic Compounds (4)**

Lecture—3 hours; laboratory—2.5 hours. Prerequisite: course 128C or the equivalent. Identification of organic compounds and investigation of stereochemical and reaction mechanism phenomena using spectroscopic methods—principally NMR, IR and MS. —W. (W.)

**219L. Laboratory in Spectroscopy of Organic Compounds (1)**

Laboratory—2.5 hours. Prerequisite: course 219 (may be taken concurrently). Restricted to Chemistry graduate students only (or consent of instructor). Practical application of NMR, IR and MS techniques for organic molecules. —S. (S.)

**221A. Special Topics in Organic Chemistry (3)**

Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. —F. (F.)

**221B. Special Topics in Organic Chemistry (3)**

Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. —F. (F.)

**221C. Special Topics in Organic Chemistry (3)**

Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. —F. (F.)

**221D. Special Topics in Organic Chemistry (3)**

Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. —F. (F.)

**221E. Special Topics in Organic Chemistry (3)**

Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. —F. (F.)

**221F. Special Topics in Organic Chemistry (3)**

Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. —F. (F.)

**221G. Special Topics in Organic Chemistry (3)**

Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. —F. (F.)

**221H. Special Topics in Organic Chemistry (3)**

Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course. —F. (F.)

**222. Chemistry of Nanoparticles (3)**

Lecture/discussion—3 hours. Prerequisite: course 110C or equivalent. Chemical and physical aspects of inorganic nanoparticles, including synthesis, purification, reactivity, characterization, and applications for technology. Emphasis is on problems from the current literature. Not open for credit to students who have taken course 122. —S. (S.) Osterloh

**226. Principles of Transition Metal Chemistry (3)**

Lecture—3 hours. Prerequisite: course 124A or the equivalent. Electronic structures, bonding, and reactivity of transition metal compounds. —F. (F.)

**228A. Bio-inorganic Chemistry (3)**

Lecture—3 hours. Prerequisite: course 226 or consent of instructor. Defines role of inorganic chemistry in the functioning of biological systems by identifying the functions of metal ions and main group compounds in biological systems and discussing the chemistry of model and isolated biological compounds. Offered every third year. —W.

**228B. Main Group Chemistry (3)**

Lecture—3 hours. Prerequisite: course 226 or consent of instructor. Synthesis, physical properties, reactions and bonding of main group compounds. Discussions of concepts of electron deficiency, hypervalency, and non-classical bonding. Chemistry of the main group elements will be treated systematically. Offered every third year. —W.

**228C. Solid-State Chemistry (3)**

Lecture—3 hours. Prerequisite: courses 124A, 110B, 226, or the equivalent. Design and synthesis, structure and bonding of solid-state compounds; physical properties and characterization of solids; topics of current interest such as low-dimensional materials, inorganic polymers, materials for catalysis. Offered every third year. —W.

**228D. Homogeneous Catalysis (3)**

Lecture—3 hours. Prerequisite: course 226. Overview of homogeneous catalysis and related methods, with emphasis on kinetics, mechanisms, and applications for organic synthesis. The related methods may include cluster, colloid, phase transfer, enzymatic, heterogeneous and polymer-supported catalysis. Offered every third year. —W.

**228E. Magnetochemistry (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: course 124A or 201 or an equivalent class from either Physics or Chemical Engineering and Materials Science. Covers the basic principles and concepts of magnetism, methods used for characterization of magnetic properties, as well as specific state-of-the-art magnetic materials and topics from the recent chemistry literature. Offered in alternate years. —F. (F.) Kovnir

**231A. Organic Synthesis: Methods and Strategies (4)**

Lecture—3 hours; lecture/discussion—3 hours. Prerequisite: course 128C or equivalent. Current strategies and methods in synthetic organic chemistry. Focus on construction of carbon frameworks, control of relative and absolute stereochemistry and retrosynthetic strategies. Use of databases and molecular modeling software in multistep strategies. —W. (W.)

**231B. Advanced Organic Synthesis (3)**

Lecture—3 hours. Prerequisite: course 231A. Current strategies and methods in synthetic organic chemistry. Continuation of course 231A. Organic synthesis of complex target molecules. Stereochemical considerations and asymmetric synthesis. Organometallics for selective transformations. Carbocyclic and heterocyclic ring formation. —F. S. (F. S.)

**233. Physical-Organic Chemistry (3)**

Lecture—3 hours. Prerequisite: courses 128A-128B-128C and 110A-110B-110C or the equivalent. Introduction to elementary concepts in physical-organic chemistry including the application of simple numerical techniques in characterizing and modeling organic reactions. —F. (F.)

**235. Organometallic Chemistry in Organic Synthesis (3)**

Lecture—3 hours. Prerequisite: course 128C. Current trends in use of organometallics for organic synthesis; preparations, properties, applications, and limitations of organometallic reagents derived from transition and/or main group metals. Offered in alternate years. —(S.)

**236. Chemistry of Natural Products (3)**

Lecture—3 hours. Prerequisite: course 128C or the equivalent. Advanced treatment of chemistry of naturally occurring compounds isolated from a variety of sources. Topics will include isolation, structure determination, chemical transformations, total synthesis, biological activity, and biosynthesis. Biosynthetic origin will be used as a unifying theme.—W. (W.)

**237. Bio-organic Chemistry (3)**

Lecture—3 hours. Prerequisite: course 128C or the equivalent. Structure and function of biomolecules; molecular recognition; enzyme reaction mechanisms; design of suicide substrates for enzymes; enzyme engineering; design of artificial enzymes and application of enzymes in organic synthesis. Offered in alternate years.—(F.)

**238. Introduction to Chemical Biology (3)**

Lecture—3 hours. Prerequisite: course 118C or 128C, or the equivalent; course 130A & B and Biological Sciences 102, 103, & 104, or the equivalents recommended. Synthesis of complex molecules in nature. Use of biosynthetic pathways in synthesis of new chemical entities. Applications of small molecules in chemical genetics and structural biology. Solving biological problems using synthetic biomolecules.—F. (F.) Beal

**240. Advanced Analytical Chemistry (3)**

Lecture—3 hours. Prerequisite: courses 110A and 115 or the equivalent. Numerical treatment of experimental data; thermodynamics of electrolyte and non-electrolyte solutions; complex equilibria in aqueous and non-aqueous solutions; potentiometry and specific ion electrodes; mass transfer in liquid solutions; fundamentals of separation science, including column, gas and liquid chromatography.—F. (F.)

**241A. Surface Analytical Chemistry (3)**

Lecture—3 hours. Prerequisite: course 110C or the equivalent. Concepts of surfaces and interfaces: physical properties, unique chemistry and electronic effects. Focus on gas-solid interfaces, with some discussion of liquid-solid interfaces. Offered in alternate years.—F.

**241B. Laser and X-ray Spectroscopy (3)**

Lecture—3 hours. Prerequisite: course 110B or the equivalent. Concepts and mechanisms of light-matter interactions. Chemical applications of modern spectroscopic methods, including multiphoton spectroscopy, time-resolved laser and x-ray photolysis, and phase-contrast x-ray imaging. Offered in alternate years.—F.

**241C. Mass Spectrometry (3)**

Lecture—3 hours. Prerequisite: course 110C and 115 or the equivalent. Mass spectrometry and related methods with emphasis on ionization methods, mass analyzers, and detectors. Related methods may include ion-molecule reactions, unimolecular dissociation of organic and bio-organic compounds, and applications in biological and environmental analysis. Offered in alternate years.—W.

**241D. Electroanalytical Chemistry (3)**

Lecture—3 hours. Prerequisite: course 110C and 115 or the equivalent. Electroanalytical chemistry with consideration of mass transfer and electrode kinetics for polarizable electrodes. Current-potential curves for a variety of conditions, including both potentiostatic and galvanostatic control, and their application in chemical analysis. Offered in alternate years.—W.

**241E. Microscopy and Imaging Techniques (3)**

Lecture—3 hours. Prerequisite: course 110C and 115 or the equivalent. Introduction to modern microscopy and imaging techniques: scanning tunneling, atomic force, far-field optical, fluorescence, scanning near-field optical, and scanning electron microscopy. Application to nanoscience and analytical and bioanalytical chemistry. Some laboratory demonstrations. Offered in alternate years.—W.

**245. Mechanistic Enzymology (3)**

Lecture—3 hours. Advanced topics in chemical kinetics relevant to enzymes, enzyme kinetics, theory of enzyme catalysis, and the analysis of a selection of organic enzyme reaction mechanisms by the tools introduced in the first part of the course.—F. (F.) Toney

**261. Current Topics in Chemical Research (2)**

Lecture—2 hours. Prerequisite: graduate standing in Chemistry or consent of instructor. Designed to help chemistry graduate students develop and maintain familiarity with the current and past literature in their immediate field of research and related areas. May be repeated for credit when topics differ.—F, W, S. (F, W, S.)

**263. Introduction to Chemical Research Methodology (3)**

Laboratory/discussion—9 hours. Prerequisite: course 293 and graduate student standing in Chemistry; consent of instructor. Introduction to identification, formulation, and solution of meaningful scientific problems including experimental design and/or theoretical analyses of new and prevailing techniques, theories and hypotheses. May be repeated for credit when topic differs. (S/U grading only.)—F, W, S. (F, W, S.)

**264. Advanced Chemical Research Methodology (6)**

Laboratory/discussion—18 hours. Prerequisite: course 263 or consent of instructor. Applications of the methodology developed in Chemistry 263 to experimental and theoretical studies. Advanced methods of interpretation of results are developed. Includes the preparation of manuscripts for publication. May be repeated for credit when topic differs. (S/U grading only.)—F, W, S. (F, W, S.)

**280. Seminar in Ethics for Scientists (2)**

Seminar—2 hours. Restricted to 20 students; graduate standing in any department of science or engineering. Studies of topical and historical issues in the ethics of science, possibly including issues such as proper authorship, peer review, fraud, plagiarism, responsible collaboration, and conflict of interest. (Same course as Physics 280 and Engineering Chemical and Materials Science 280.) (S/U grading only.)—S. (S.)

**290. Seminar (2)**

Seminar—2 hours. Prerequisite: consent of instructor. (S/U grading only.)—F, W, S. (F, W, S.)

**293. Introduction to Chemistry Research (1)**

Discussion—2 hours. Designed for incoming graduate students preparing for higher degrees in chemistry. Group and individual discussion of research activities in the Department and research topic selection. (S/U grading only.)—F. (F.)

**294. Presentation of Chemistry Research (1)**

Seminar—2 hours. Prerequisite: graduate standing. Restricted to graduate students in Chemistry who have not yet given their departmental presentation. Introduces first- and second-year Chemistry graduate students to the process of giving an effective research presentation. Advanced Ph.D. students give formal seminars describing the design and execution of their research projects. May be repeated three times for credit. (S/U grading only.)—F, S. (F, S.)

**295. Careers in Chemistry (1)**

Seminar—2 hours. Prerequisite: graduate standing in Chemistry. Designed to give Chemistry graduate students an in-depth appreciation of career opportunities with a M.S. or Ph.D. degree in chemistry. Professional chemists (and allied professionals) give seminars describing both research and career insights. May be repeated for credit 3 times. (S/U grading only.)—F.

**296. Research in Pharmaceutical Chemistry (6)**

Laboratory—18 hours. Prerequisite: courses 130A and 130B, 135, and 233 (may be taken concurrently); consent of instructor. Restricted to students in the Integrated B.S./M.S. Program in Chemistry. Lab-

oratory provides qualified graduate students with the opportunity to pursue original investigation in Pharmaceutical Chemistry and allied fields in order to fulfill the letter-graded research requirement of the Integrated B.S./M.S. Program in Chemistry (Pharmaceutical Chemistry Emphasis). May be repeated three times for credit when topic differs.—F, W, S, Su. (F, W, S, Su.)

**298. Group Study (1-5)**

W. (W.)

**299. Research (1-12)**

The laboratory is open to qualified graduate students who wish to pursue original investigation. Students wishing to enroll should communicate with the department well in advance of the quarter in which the work is to be undertaken. (S/U grading only.)

**Professional****390. Methods of Teaching Chemistry (2)**

Lecture—1 hour; discussion—1 hour. Prerequisite: graduate student standing in Chemistry and consent of instructor. Practical experience in methods and problems of teaching chemistry. Includes analyses of texts and supporting material, discussion of teaching techniques, preparing for and conducting of discussion sessions and student laboratories. Participation in the teaching program required for Ph.D. in chemistry. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**392. Advanced Methods of Teaching Chemistry (2)**

Lecture—2 hours. Prerequisite: course 390. Advanced topics in teaching chemistry. Analysis and discussion of curricular design, curricula materials, teaching methods and evaluation. For students who are planning a career in teaching chemistry. (P/NP grading only.)—S. (S.)

## Chicana/Chicano Studies

(College of Letters and Science)

Carlos F. Jackson, M.F.A., Chairperson of the Department

**Department Office.** 2102 Hart Hall  
530-752-2421; Fax 530-752-8814;  
<http://chi.ucdavis.edu>

**Faculty**

Angie Chabram, Ph.D., Professor  
Sergio de la Mora, Ph.D., Associate Professor  
Adela de la Torre, Ph.D., Professor  
Yvette Flores, Ph.D., Professor  
Carlos F. Jackson, M.F.A., Associate Professor  
Kevin R. Johnson, J.D., Professor (*School of Law*)  
Maceo Montoya, M.F.A., Assistant Professor  
Clarissa Rojas, Ph.D., Assistant Professor  
Natalia Deeb-Sossa, Ph.D., Associate Professor  
Susy Zepeda, Ph.D., Assistant Professor

**Emeriti Faculty**

Malaquias Montoya, B.F.A., Professor Emeritus  
Beatriz Pesquera, Ph.D., Associate Professor Emerita  
Refugio Rochin, Ph.D., Professor Emeritus  
Adaljiza Sosa-Riddell, Ph.D., Senior Lecturer Emerita

**The Major Program**

The Department of Chicana/Chicano Studies offers an interdisciplinary curriculum focusing on the Chicana/Chicano experience through an analysis of class, race, ethnicity, gender and sexuality, and cultural expression. The department offers a major leading to the Bachelor of Arts degree and a minor that can satisfy breadth requirements for the College of Letters and Science. Both the major and minor frame an analysis within the historical and contemporary experiences of Chicanas/os in the Americas. The major gives students an opportunity to specialize in one of two emphases: Cultural Studies or Social/Policy Studies. Students in the major are expected to read, write, and speak Spanish at a level suitable for

future study and work in Chicana/o and Latina/o settings. There are no language requirements for the minor, and all Chicana/Chicano Studies courses are open to students in any major.

**The Program.** At the lower division level, the major curriculum provides an interdisciplinary overview of various topics. Students are advised to take courses that serve as prerequisites for certain upper division courses. At the upper division level, majors pursue advanced interdisciplinary course work in both the humanities/arts and the social sciences. At this level, students will find courses in Chicana/Chicano history, theory, health and several courses taught from a variety of disciplinary perspectives. Majors may specialize in one of two emphases for the A.B. degree. The Cultural Studies emphasis integrates literature, culture, and artistic expression. Social/Policy Studies emphasizes social theory, research methods, area studies in community/political economy, family, societal and health issues.

**Career Alternatives.** The Cultural Studies emphasis prepares students for professional work in cross-cultural education, cultural/art centers, artistic expression and communications. The Social/Policy Studies emphasis orients students towards professional work in human service delivery, community development, legal services assistance, health services, social welfare and education. Both emphases in the major prepare students for advanced graduate and/or professional studies in related fields.

#### A.B. Major Requirements:

	UNITS
<b>Cultural Studies Emphasis:</b>	
<b>Preparatory Subject Matter.....</b>	<b>16-31</b>
Chicana/o Studies 10, 50 .....	8
Chicana/o Studies 21 or 40 .....	4
One of Chicana/o Studies 60, 65, 70, or 73 .....	4
Spanish 1, 2, 3, or 28, 31, 32 or the equivalent .....	0-15
<b>Depth Subject Matter .....</b>	<b>40</b>
One course from: Chicana/o Studies 150, 181 History 165, 166B, 169A, 169B .....	4
Two courses from: Chicana/o Studies 100, 110, 111, 112, 130, 131, 132, 181 .....	8
Comparative ethnicity/gender: two upper division courses selected from two of the following areas: African American and African Studies, Asian American Studies, Native American Studies, or Women's Studies .....	8
Two courses from: Chicana/o Studies 110, 112, 120, 121, 122, 123 .....	8
Three courses from: Chicana/o Studies 154, 55, 156, 160, 165, 171, 172 .....	12
<b>Total Units for the Major .....</b>	<b>56-71</b>
<b>Social/Policy Studies Emphasis:</b>	
<b>Preparatory Subject Matter.....</b>	<b>20-35</b>
Chicana/o Studies 10, 50 .....	8
Chicana/o Studies 21 or 40 .....	4
One course from: Chicana/o Studies 60, 65, 70, or 73 .....	4
One course from: Chicana/o Studies 23, 140A Sociology 46A or Psychology 41....	4
Spanish 1, 2, 3, or 28, 31, 32 or the equivalent .....	0-15
<b>Depth Subject Matter .....</b>	<b>40</b>
One from Chicana/o Studies 150, 181, History 165, 166B, 169A or 169B .....	4
Two courses from: Chicana/o Studies 154, 155, 156, 160, 165, 171, or 172 .....	8
Comparative ethnicity/gender: two upper division courses selected from two of the following areas: African American and African Studies, Asian American Studies, Native American Studies, or Women's Studies .....	8

Three courses from: Chicana/o Studies 100, 110, 111, 112, 130, 131, 132 .....	12
or 181 .....	12
Two courses from: Chicana/o Studies 110, 112, 120, 121, 122 or 123 .....	8
<b>Total Units for the Major .....</b>	
<b>60-75</b>	

**Major Adviser.** A. Martinez

#### Minor Program Requirements:

This minor provides a broad overview of the historical, social, political, economic, ideological and cultural forces that shape the Chicana/o and Latina/o experience. The minor is open to all students with or without course work in Spanish. Students should contact the master adviser for a plan approval and verification of the minor.

	UNITS
<b>Chicana/o Studies.....</b>	<b>24</b>

Chicana/o Studies 10 or 50 .....	4
Chicana/o Studies 150 or 181 or History 169A or 169B.....	4
Four courses from: Chicana/o Studies 110, 111, 112, 120, 121, 122, 123, 130, 131, 132, 154, 155, 156, 160, 165, 171, 172.....	16

**Minor Adviser.** A. Martinez

#### Courses in Chicana/Chicano Studies (CHI)

##### Lower Division

###### **10. Introduction to Chicana/o Studies (4)**

Lecture—3 hours; discussion—1 hour. Analysis of the situation of the Chicana/o (Mexican-American) people, emphasizing their history, literature, political movements, education and related areas. Offered in alternate years. GE credit: Div, Wrt | ACGH, AH or SS, DD, OL, WE.—F. W. Jackson

###### **21. Chicana/o and Latina/o Health Care Issues (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 10. Overview of health issues of Chicanas/os and Latinas/os in the State of California; role of poverty/lack of education in limited access to health care. GE credit: Div | OL, WE.—Flores, de la Torre

###### **21S. Chicana/o and Latina/o Health Care Issues (4)**

Lecture—4 hours. Prerequisite: Spanish 3 or the equivalent. Overview of health issues of Chicanas/os and Latinas/os in the State of California; role of poverty/lack of education and limited access to health care. All course instruction for this course will be in Spanish. Course is taught abroad. Not open for credit to students who have completed course 21. GE credit: Div | OL, WC, WE.—F. (F.) Flores, de la Torre

###### **23. Qualitative Research Methods (4)**

Lecture/discussion—3 hours; discussion—1 hour. Dominant models of qualitative inquiry in educational and social science research as well as mestizo approaches to research with latinos. Emphasis given to choosing and designing culturally appropriate strategies to investigate latino health, education, social context, and policy issues. GE credit: SocSci | AH, OL, SS, WE.—S. (S.)

###### **30. United States Political Institutions and Chicanas/os (4)**

Lecture/discussion—3 hours; term paper. Overview of the major political institutions and ideologies of the United States and the Chicana/o people's historical and contemporary role in, effects from, and responses to them. Theory, method and critical analysis. Offered irregularly. GE credit: Div | ACGH, DD, OL, SS, WE.

###### **40. Comparative Health: Top Leading Causes of Death (4)**

Lecture/discussion—3 hours; discussion—1 hour. Prerequisite: Statistics 13 or consent by instructor. Introduction to the epidemiology of the leading causes of death for ethnic/racial minorities. Assess-

ment of disproportionate rates at which ethnic/racial minorities suffer and die from chronic and infectious diseases and injuries and statistical methods used to calculate these rates. Not open for credit to students who have completed course 40S. GE credit: SciEng, Div, Wrt | QL, SE, WE.—W. Deeb-Sossa, Rojas

###### **40S. Comparative Health: Leading Causes of Death (4)**

Lecture—4 hours. Prerequisite: Statistics 13 or consent by instructor. Introduction to epidemiology of leading causes of death for ethnic/racial minorities. Assessment of disproportionate rates at which ethnic/racial minorities suffer & die from chronic and infectious diseases & injuries & statistical methods used to calculate these rates. Offered abroad. Not open for credit to students who have completed course 40. GE credit: SciEng, Div, Wrt | QL, SE, WC, WE.

###### **50. Chicana and Chicano Culture (4)**

Lecture—3 hours; discussion—1 hour. Interdisciplinary survey of Chicana/cultural representation in the 20th century. Examines Chicana/o culture within a national and transnational context. Explores how Chicano cultural forms and practices intersect with social/material forces, intellectual formations and cultural discourses. (Former course 20.) Offered in alternate years. GE credit: Div | ACGH, AH, DD, WC, WE.—W. S. Chabram, de la Mora, M. Montoya

###### **60. Chicana and Chicano Representation in Cinema (4)**

Lecture—3 hours; discussion—1 hour; film viewing—2 hours. Introductory-level study of Chicana and Chicano representation in cinema. Depiction of Chicana and Chicano experience by Chicana/o filmmakers, as well as by non-Chicanos, including independent filmmakers and the commercial industry. GE credit: ArtHum, Div | ACGH, AH, DD, VL, WE.—W. de la Mora

###### **65. New Latin American Cinema (4)**

Lecture/discussion—2 hours; discussion—1 hour; film viewing—3 hour. Historical, critical, and theoretical survey of the cinemas of Latin America and their relationship to the emergence of U.S. Latino cinema. Emphasis on representation and social identity, including gender, sexuality, class, race and ethnicity. GE credit: ArtHum, Div | AH, VL, WC, WE.—W. (W.) de la Mora

###### **70. Survey of Chicana/o Art (4)**

Lecture—4 hours. Survey of contemporary Chicana/o art in context of the social turmoil from which it springs. Includes political use of the poster and the mural, the influence of the Mexican mural and graphic movement, and social responsibility of the artist. GE credit: Div | ACGH, AH, DD, VL, WC, WE.—F. Jackson, Montoya

###### **73. Chicana/o Art Expression Through Silk Screen (4)**

Studio—8 hours; laboratory—4 hours. Introductory level studio course using silk screen and basic printing techniques to explore and develop images of Chicana/o cultural themes and expressions. Students will experiment with images and symbols from their immediate environment/culture. Integrated approach to Chicana/o philosophy of art. GE credit: ACGH, AH, DD, OL, VL, WC.—F. Jackson

###### **92. Internship (1-12)**

Internship—3-36 hours. Prerequisite: course 10 or consent of instructor. Academic guidance combined with internship in community agencies serving Mexican/Latina/Latino/Chicana/Chicano clients. Use of bilingual skills and knowledge of history, culture, economics, politics and social issues. May be repeated for credit up to 12 units. (P/NP grading only.)

###### **98. Directed Group Study (1-5)**

(P/NP grading only.)

###### **99. Special Study for Undergraduates (1-5)**

(P/NP grading only.)

**Upper Division****100. Chicana/Chicano Theoretical Perspective (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: courses 10 and 50. Critical examination of emerging Chicana/o Studies theoretical perspectives in light of contemporary intellectual frameworks in the social sciences, arts, and humanities. Includes analysis of practices of self-representation, and socio-cultural developments in the Chicana/o community. GE credit: ACGH, DD, SS, WC, WE.—S. (S.) Chabram, Zepeda

**110. Sociology of the Chicana/o Experience (4)**

Lecture/discussion—4 hours. Prerequisite: course 10 or Sociology 1. The Chicana/o experience in the American society and economy viewed from theoretical perspectives. Immigration, history of integration of Chicana/o labor into American class structure, education inequality, ethnicity, the family and Chicana/o politics. (Former course Sociology 110.) GE credit: SocSci, Div, Wrt | ACGH, DD, OL, SS, WE.—S. Deeb-Sossa, Zepeda

**111. Chicanas/Mexicanas in Contemporary Society (4)**

Lecture/discussion—4 hours. Prerequisite: course 10 or 50, Women's Studies 50 or History 169B. Analysis of the role and status of Chicanas/Mexicanas in contemporary society. Special emphasis on their historical role, the political, economic and social institutions that have affected their status, and their contributions to society and their community. (Former course 102.) GE credit: ArtHum | ACGH, DD, SS, WE.—Deeb-Sossa

**112. Globalization, Transnational Migration, and Chicana/o and Latina/o Communities (4)**

Lecture—4 hours. Prerequisite: course 10. Chicana/o and Latina/o migration experiences within a global context. Topics include national and/or transnational migration in Mexico, Central America, and the United States. GE credit: SocSci, Div, Wrt | ACGH, DD, OL, SS, WE.—Deeb-Sossa

**113. Latin American Women's Engagement in Social Movements (4)**

Lecture/discussion—3 hours; term paper. Examination of how women of different racial/ethnic and class backgrounds in Latin America challenge their marginalization. Exploration of US foreign policy, its effects on Latin American's institutions and on Latin American citizens. Using Chicana feminist perspective. Offered in alternate years. GE credit: SocSci | ACGH, DD, SS, WC, WE.—Deeb-Sossa

**114. Women of Color Reproductive Health and Reproductive Politics in a Global Perspective (4)**

Lecture/discussion—3 hours; term paper. Study contemporary issues in reproductive health and reproductive politics, both globally and in the U.S., for women of color. Offered in alternate years. GE credit: SocSci | ACGH, DD, SS, WC, WE.—Deeb-Sossa

**114S. Women of Color Reproductive Health and Gender Politics in Cuba and the US (4)**

Lecture/discussion—3 hours; term paper. Study of contemporary issues in reproductive health, reproductive politics, and gender politics both in Cuba and in the U.S., for women of color. Offered in alternate years. GE credit: SocSci | ACGH, DD, SS, WC, WE.—W. (W.) Deeb-Sossa

**120. Chicana/o Psychology (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21; introductory psychology course recommended. Introduction to the field of Chicana/o psychology. Analysis of socio-cultural context of Chicanas/os and Latinas/os. Special attention to issues of ethnic identity development, bilingualism, and development of self esteem. Impact of minority experience, migration, acculturation are examined. GE credit: SocSci, Div | ACGH, DD, OL, SS, WE.—Flores

**121. Chicana/o Community Mental Health (4)**

Lecture—3 hours; term paper. Prerequisite: course 10 or 20. Mental health needs, problems, and service utilization patterns of Chicanas/os and Latinas/os will be analyzed. An analysis of social service policy, and the economic context of mental health programs. Offered Alternate Years. GE credit: SocSci, Div, Wrt | ACGH, DD, OL, SS, WE.—Flores

**122. Psychology Perspectives Chicana/o and Latina/o Family (4)**

Lecture—4 hours. Prerequisite: course 10; introductory psychology course highly recommended, and/or consent of instructor. Role of migration and acculturation on family structure and functioning. From a psychological and Chicana/o Studies perspective, contemporary gender roles and variations in family structures are examined. Special topics include family violence, addiction, family resilience and coping strategies. GE credit: SS, WE.—F. Flores

**122S. Psychology Perspectives Chicana/o and Latina/o Family (4)**

Lecture—4 hours. Role of migration and acculturation on family structure and functioning. From a psychological and Chicana/o Studies perspective, contemporary gender roles and variations in family structures are examined. Special topics include family violence, addiction, family resilience and coping strategies. This course is taught abroad. Not open for credit to students who have completed course 122. GE credit: OL, SS, WC, WE.—Flores

**123. Psychological Perspectives on Chicana/o and Latina/o Children and Adolescents (4)**

Lecture—3 hours; term paper. Prerequisite: course 10 or 21. Restricted to upper division standing. Psychological and educational development of Chicano/Latino children and adolescents, with particular attention to the formation of ethnic, gender, class, race, and sexual identities. GE credit: SocSci, Div, Wrt | ACGH, DD, OL, SS, WE.—Flores

**125S. Latino Families in the Age of Globalization: Migration and Transculturación (4)**

Lecture/discussion—4 hours. Prerequisite: Spanish 3 or equivalent highly recommended. Impact of globalization on Latino families in the American continent. Relationships of political structure, economics and family. Intimate partner violence, child maltreatment and alcohol/drug abuse in contemporary Latino families. Offered in a Spanish speaking country. 125S GE credit: OL, SS, WC, WE.—Flores

**130. United States-Mexican Border Relations (4)**

Lecture—3 hours; term paper. Prerequisite: upper division standing. Theories of U.S.-Mexican border relations, with an overview of the political, economic, and social relationships and an in-depth analysis of immigration issues, border industrialization, women's organizations, economic crises, and legal issues. GE credit: Div | ACGH, DD, SS, WE.—F. (F.) Chabram, Rojas

**131. Chicanas in Politics and Public Policy (4)**

Lecture/discussion—4 hours. Prerequisite: course 30 or Political Science 1. Historical and political analysis of Chicana/Latina political involvement and activities in the general political system, women's movement, Chicano movement, and Chicana movement. Course also examines the public policy process and the relationship of Chicanas/Latinas to public policy formation. Offered in alternate years. GE credit: SocSci, Div | ACGH, DD, OL, SS, WE.—W. (W.) Deeb-Sossa

**131S. Chicanas in Politics and Public Policy (4)**

Lecture/discussion—4 hours. Historical and political analysis of Chicana/Latina political involvement and activities in the general political system, women's movement, Chicano/a movement. Course also examines the public policy process and the relationship of Chicanas/Latinas to public policy formation.

Offered abroad. Not open for credit to students who have completed course 131. GE credit: SocSci, Div | OL, SS, WC, WE.

**132. Political Economy of Chicana/o Communities (4)**

Lecture—3 hours; term paper. Prerequisite: upper division standing; lower division Chicana/o Studies course recommended. Historical and contemporary study of political and economic forces which define and influence the development of Chicana/o communities. Includes critiques of traditional and Marxian theories and concepts applicable to Chicana/o communities, case studies of Chicana/o communities, especially in California and Texas. GE credit: ACGH, DD, OL, WE.—S.

**135S. Transnational Latina/o Political Economy (4)**

Lecture—3 hours; term paper. Prerequisite: Spanish 3 or equivalent, or consent of instructor; Economics 1A and 1B recommended. Intensive reading, discussion and research on selected topics from Latin America and the US with regard to immigrant and native communities. Topics include comparative immigration and macroeconomic policies in the US and Latin America. Offered in a Spanish speaking country. Offered irregularly. GE credit: OL, WC, WE.

**140A. Quantitative Methods: Chicano/Latino Health Research (4)**

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: two years of high school algebra or the equivalent in college. Focuses on measuring Latino/Chicano health outcomes using a quantitative approach. Assesses main types of study designs and addresses measurement of disease frequency and health effects. Offered in alternate years. GE credit: SciEng | ACGH, DD, QL, SE.—S. (S.) Deeb-Sossa

**141. Community-Based Participatory Research and Chicana/o and Latina/o Health (4)**

Lecture/discussion—3 hours; term paper. Overview of CBPR, as well as methodological CBPR considerations in building community partnerships, community assessment, issue analysis, research planning, data gathering, and data sharing with Chicana/o and Latina/o communities in particular. GE credit: WE.—F. (F.) Flores, Deeb-Sossa

**145S. Bi-National Health (5)**

Lecture—5 hours. Prerequisite: Biological Sciences 1A-1B-1C, Spanish 21 or 31 or consent of instructor; upper division standing only. Examination of health status and intervention strategies presented in public health care settings, private clinics and by indigenous healers in Mexico. Analysis of impact of high risk diseases. Offered in a Spanish speaking country under supervision of UC Davis faculty/lecturer. GE credit: OL, WC, WE.—F. Flores, de la Torre

**146S. Public Health in Latin America (5)**

Lecture/discussion—4 hours; term paper. Critical examination of emerging Public Health issues in Latin America in light of economic, political and social conditions. Contemporary behavioral frameworks used in public health. Includes analysis of clinical medicine and health care systems.—de la Torre

**147S. Indigenous Healing and Biodiversity in Latin America (5)**

Lecture—4 hours; term paper. Contrast between western and traditional healing practices in Latin America and the role of the natural environment in creating sustainable health delivery systems. Questions of health status attributable to public health and environmental risk factors. GE credit: OL, WC, WE.—F. de la Torre

**150. The Chicana and Chicano Movement (4)**

Lecture—3 hours; term paper. Development of the Chicano Movement within the context of the socio-political movements of the 1960's in a national and global perspective. Ideological/political perspectives and the implications for political strategies. GE credit: ArtHum, Div, Wrt | ACGH, AH or SS, DD, WC, WE.—W. (W.) Deeb-Sossa

**154. The Chicana/o Novel (4)**

Lecture—4 hours. Prerequisite: intermediate Spanish or consent of instructor. Introduction to the forms and themes of the Chicana/o novel with special attention to the construction of gender, nationality, sexuality, social class, and the family by contemporary Chicana/o novelists. Bilingual readings, lectures, discussions, and writing in Spanish. (Former course Spanish 126A.) GE credit: ArtHum, Div | ACGH, AH, DD, OL, WC, WE.—W. Chabram, Montoya

**155. Chicana/o Theater (4)**

Lecture—4 hours. Prerequisite: intermediate Spanish or consent of instructor. Examination of the formal and thematic dimensions of Chicana/o theater in the contemporary period with special emphasis on El Teatro Campesino and Chicana Feminist Theater. Bilingual readings, lectures, discussions, and writing in Spanish. (Former course Spanish 126B.) GE credit: ACGH, AH, DD, OL, VL, WC, WE.—Chabram

**156. Chicana/o Poetry (4)**

Lecture—4 hours. Prerequisite: intermediate Spanish or consent of instructor. Survey of Chicana/o poetry with special emphasis on its thematic and formal dimensions. Bilingual readings, lectures, discussions, and writing in Spanish. (Former course Spanish 126C.) GE credit: ACGH, AH, DD, OL, WC, WE.—S. Chabram

**157. Chicana and Chicano Narrative (4)**

Lecture/discussion—3 hours; term paper. Exploration of contemporary forms of the Chicana and Chicano narrative, encompassing visual art, fiction, poetry, film, theater, and creative nonfiction. Exposure to a variety of artists and scholars whose work shapes our evolving understanding of the Chicana/o experience. GE credit: ArtHum | ACGH, AH, DD, VL, WC, WE.—S. Montoya

**160. Mexican Film and Greater Mexican Identity (4)**

Lecture/discussion—4 hours; film viewing—1 hour. Prerequisite: intermediate Spanish. Survey of the role Mexican cinema plays in consolidation and contestation of post-revolutionary Mexican state and in the formation of a greater Mexican cultural identity including Chicana/o identity. Showcases genres, periods, auteurs, movements, and emphasis on gendered and sexualized narratives. GE credit: ArtHum, Div | AH, VL, WC, WE.—de la Mora

**161. Queer Latinidad (4)**

Lecture/discussion—3 hours; term paper or discussion. Introduction to queer Latina and Latino studies with a focus on Chicana and Chicano theory and cultural production. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.—S. (S.) de la Mora, Zepeda

**165. Chicanas, Latinas and Mexicanas in Commercial Media (4)**

Lecture/discussion—4 hours; laboratory—2 hours. Prerequisite: course 60 or other film or feminist theory course; conversational fluency in Spanish. The portrayal of Chicanas, Latinas and Mexicanas in commercial media. The relation between the representation of Chicana, Latina, and Mexicana women in commercial television and cinema and the role of women in Mexican and U.S. societies. Offered in alternate years. GE credit: AH, VL, WC, WE.—de la Mora

**170. Contemporary Issues in Chicano Art (4)**

Lecture—4 hours. Issues and conflicts in the dismantling of the Contemporary Chicano Art Movement. Response and challenge to the dominant culture. GE credit: ACGH, AH, DD, VL, WC, WE.—Jackson

**171. Mexican and Chicano Mural Workshop (4)**

Studio—8 hours; independent study—1 hour. Prerequisite: course 70; consent of instructor. The Mural: a collective art process that empowers students and people through design and execution of mural paintings in the tradition of the Mexican Mural Movement; introduces materials and techniques.

May be repeated one time for credit. (Same course as Art Studio 171.) GE credit: ArtHum | AH, VL.—S. Jackson, Montoya

**172. Chicana/o Voice/Poster Silk Screen Workshop (4)**

Studio—8 hours; independent study—1 hour. Prerequisite: course 70 or course 73 and consent of instructor. The poster as a voice art form used by Chicanas/os and other people of color to point to the defects of social and political existence and the possibility for change, from the Chicana/o artists' perspective. May be repeated one time for credit. GE credit: AH, OL, VL, WC.—W. Jackson

**180. Grant Writing in the Chicana/o/Latina/o Community (4)**

Lecture—4 hours. Prerequisite: course 10, 23 or consent of instructor. Upper division standing. Overview of key elements for grant writing. Topics include community needs assessments, development of human subjects protocols, data collection, methods, evaluation designs and community based methodologies for grant development applications in the Latino community. Offered irregularly.—de la Torre

**181. Chicanas and Latinas in the U.S.: Historical Perspectives (4)**

Lecture/discussion—4 hours. Prerequisite: course 10 or Women's Studies 50. Historical issues in the lives of Chicanas, Puerto Ricanas, and Cubans in the U.S. and their countries of origin. GE credit: ArtHum, Div, Wrt | ACGH, AH or SS, DD, WE.

**182. Race and Juvenile Justice (4)**

Lecture—4 hours. Prerequisite: course 10 or equivalent. Individual and institutional responses to "troublesome" youth of color through history and in contemporary society. Emphasis on how race, as well as ethnicity, class, and gender have informed the treatment of "delinquent" youth. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, DD, OL, SS, WE.—Rojas

**184. Latino Youth Gangs in Global Perspective (4)**

Lecture—3 hours; term paper. Comparative analysis of Latino youth gangs in Europe, Latin America, and the United States. Social, economic, political, and cultural factors leading to youth gangs as well as the responses are considered within a global perspective. Not open for credit to students who have completed course 184S. Offered irregularly. GE credit: SocSci | ACGH, DD, OL, SS, WC, WE.

**185. Latino Youth Gangs in Global Perspective (4)**

Lecture—12 hours. Comparative analysis of Latino youth gangs in Europe, Latin America, and the United States. Social, economic, political, and cultural factors leading to youth gangs as well as the responses to the youths are considered within a global perspective. Not open for credit to students who have completed course 184. Offered irregularly. GE credit: SocSci | ACGH, DD, OL, SS, WC, WE.

**192. Internship in the Chicana/Chicano/Latino Community (1-12)**

Internship—3-36 hours. Prerequisite: course 10, 21, or 50, Spanish 3 or the equivalent. Academic guidance combined with internship in community agencies serving Mexican/Latina/Latino/Chicana/Chicano clients. Use of bilingual skills and knowledge of history, culture, economics, politics and social issues. Internship project required. May be repeated for credit up to 12 units. (P/NP grading only.)

**192S. Internship (1-12)**

Internship. Prerequisite: consent of instructor; course 10, 21, or 50; Spanish 3 or equivalent. May be repeated for credit (P/NP grading only.)

**194HA. Senior Honors Research Project (2-5)**

Independent study—6-15 hours. Prerequisite: senior standing in Chicana/o Studies major. Student is required to read, research, and write Honors Thesis

on Chicana/o Studies topics. (Deferred grading only, pending completion of sequence.) GE credit: OL, WE.—F, W, S. (F, W, S.)

**194HB. Senior Honors Research Project (2-5)**

Independent study—6-15 hours. Prerequisite: senior standing in Chicana/o Studies major. Student is required to read, research, and write Honors Thesis on Chicana/o Studies topics. (Deferred grading only, pending completion of sequence.) GE credit: OL, WE.—F, W, S. (F, W, S.)

**194HC. Senior Honors Research Project (2-5)**

Independent study—6-15 hours. Prerequisite: senior standing in Chicana/o Studies major. Student is required to read, research, and write Honors Thesis on Chicana/o Studies topics. (Deferred grading only, pending completion of sequence.) GE credit: OL, WE.—F, W, S. (F, W, S.)

**198. Directed Group Study (1-5)**

Prerequisite: upper division standing and consent of Program Chairperson. (P/NP grading only.)

**198S. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: upper division standing and consent of Program Chairperson. (P/NP grading only.)

**199S. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate****230. Chicano/Latino Hispanic Politics (4)**

Seminar—3 hours; term paper. Prerequisite: two undergraduate courses in Chicana/o Studies or consent of instructor. Examination of Chicano/Latino political experiences. Evaluate theories, ideology, and practice of Chicano politics. Brief history of Chicano/Latino/Hispanic political activity, comparisons among political modes, gendered politics, and understanding relationships among Chicano, Mexican, American and world politics. Offered irregularly.—Chabram

**298. Group Study for Graduate Students (1-5)**

Prerequisite: graduate standing, consent of instructor. May be repeated for credit when topic differs. (S/U grading only.)

**299. Special Study for Graduate Students (1-12)**

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

**Professional****396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

**Child Development (A Graduate Group)**

Katherine J. Conger, Ph.D., Group Chairperson

**Group Office.** 1315 Hart Hall

530-754-4109;

<http://humandev.ucdavis.edu/>

**Faculty.** See Human Development (A Graduate Group), on page 373.

**Graduate Study.** The Graduate Group in Child Development offers a multidisciplinary program leading to an M.S. degree. The program provides students with an opportunity to pursue a coordinated course of postgraduate study in the field of child development which cuts across departmental boundaries. Students may work with children and families in the community, as well as the University's Center

for Child and Family Studies. Recipients of the degree gain sufficient background to engage in professions that directly (e.g., preschool, 4-H) or indirectly (e.g., social policy) involve children and families, obtain positions in teaching or research settings, or pursue further study leading to a doctorate in child development, human development, clinical psychology, or related fields.

Applicants seeking admissions and fellowships consideration must submit all materials by our priority December 15 deadline. The final admissions deadline is March 1. See our website for more details.

**Graduate Adviser.** Contact Group office.

## Chinese

See **Asian American Studies**, on page 182; **East Asian Languages and Cultures**, on page 244; and **East Asian Studies**, on page 249.

## Cinema and Digital Media

(College of Letters and Science)

Michael Neff, Ph.D., Program Director  
Kriss Ravetto-Biagioli, Ph.D., Program Director

**Program Office.** 101 Art Building  
530-752-0890; <http://catcs.ucdavis.edu>

### Committee in Charge

Stephanie Boluk, Ph.D.  
(*English, Cinema and Digital Media*)

Jesse Drew, Ph.D.  
(*Cinema and Digital Media*)

Jaimey Fisher, Ph.D. (*German and Russian, Cinema and Digital Media*)

Patrick Lemieux, Ph.D. (*Cinema and Digital Media*)

Colin M. Milburn, Ph.D. (*English, Science and Technology Studies, Cinema and Digital Media*)

Fiamma Montezemolo, Ph.D.  
(*Cinema and Digital Media*)

Michael Neff, Ph.D. (*Computer Science, Cinema and Digital Media*)

Bob Ostertag, Ph.D. (*Cinema and Digital Media*)

Kriss Ravetto-Biagioli, Ph.D. (*Science and Technology Studies, Cinema and Digital Media*)

Eric Smoodin, Ph.D. (*American Studies*)

Julie Wyman, M.F.A. (*Cinema and Digital Media*)

### Faculty

Stephanie Boluk, Ph.D.

Jesse Drew, Ph.D.

Kris Fallon, Ph.D.

Jaimey Fisher, Ph.D.

Timothy Lenoir, Ph.D.

Patrick Lemieux, Ph.D.

Colin M. Milburn, Ph.D.

Fiamma Montezemolo, Ph.D.

Michael Neff, Ph.D.

Bob Ostertag, Ph.D.

Kriss Ravetto-Biagioli, Ph.D.

Julie Wyman, M.F.A.

### Emeriti Faculty

Frances Dyson, Ph.D., Professor Emerita

Lynn Hershman, M.A., Professor Emerita

Sarah Pia Anderson, B.A., Professor Emerita

### The Cinema and Digital Media Major Program

The Cinema and Digital Media (CDM) program combines the study of audio-visual and digital media, theories about such media, and the relevant modes of artistic practice and production. CDM integrates the analysis of audio-visual and digital texts with their theoretical underpinnings and their methods of production. The program also addresses the

particular impact that technology has on culture in its many forms and fields.

CDM faculty teach and research on various histories, theories, and practices of media. Current fields for teaching and research in cinema and digital media include the history and analysis of film and video, film and video production, electronic music, digital content creation and design, the digital arts, community media and activism, computer graphics, animation, and gaming—as well as the theories and politics of these various areas.

**The Program.** Preparatory course work involves a solid introduction to the history, ideas and current trends in cinema and digital media. For depth subject matter, students in the major select a combination of critical studies and creative production courses. Two courses will be selected from the production/programming distribution, two from the theory/history distribution and four will be elected by the student, allowing them to take up to six production courses or six studies/theory classes, should they so choose.

**Career Alternatives.** Cinema and Digital Media is designed to prepare graduates to be highly adaptable analytical thinkers, collaborative, multi-skilled and current with the latest developments in media and technology. Perhaps most importantly is self-motivation: students do best when fueled by their own passions and plot their own directions, while held to very high standards. We feel this is the best education for living and working in a complex, rapidly changing world. Final research papers and creative production portfolios will provide graduate school admissions committees, employers or clients with tangible evidence of Cinema and Digital Media graduates' track records and talents.

**Course Changes.** Cinema and Digital Media is working on updating all of the existing FMS, TCS, and CTS courses to the CDM course code. If you have any questions regarding the course code changes and equivalent major requirements please contact the Arts Group Advising Center at 530-752-0890.

### A.B. Major Requirements:

UNITS

#### Preparatory Subject Matter.....25

Choose two courses from:

Film Studies 1; Technocultural Studies 1 or 5 ..... 8

Cinema and Technocultural Studies 12, 20 ..... 9

Choose two courses from:

Cinema and Technocultural Studies 40A, 40B, 41A, 41B; Film Studies 45 ..... 8

#### Depth Subject Matter .....37-38

Film Studies 127 or Cinema and Technocultural Studies 150 ..... 5

Choose two courses for a total of 8 units from the following courses:

Art Studio 114A, 114B, 114C, 117; Cinema and Technocultural Studies 116, 124E, 174; Technocultural Studies 100, 101, 103, 104, 111, 112, 113, 115, 121, 122, 123, 125, 130, 131, 170A-E, 175, 192, 198, 199 ..... 8

Choose two courses for a total of 8 units from the following courses:

Cinema and Technocultural Studies 146A, 147A, 150; Film Studies 120, 121, 121S, 124, 125, 127, 129, 142, 176A, 189, 194H, 195H, 198, 199; Science and Technology Studies 160; Technocultural Studies 151, 152, 155, 158, 159.

Some courses are identified as fulfilling more than one requirement; a given course can only fulfill one such requirement ..... 8

Plus four additional courses chosen from the lists above for a total of at least 16 units ..... 16

#### Total Units for the Major .....62-63

**Major Adviser.** Information on the current Academic Advisers can be obtained by contacting the Arts Group Advising Center at 530-752-0890.

### The Film Studies Major Program

Major is closed to new students beginning 2015-2016.

Interested students are encouraged to explore the Film Studies minor which is open to new and current students, and the Cinema and Digital Media major which incorporates many of the courses previously offered through Film Studies.

**The Program.** The interdisciplinary major in Film Studies takes one of the most influential art forms of the twentieth century and today as its object of study. The field of Film Studies addresses the history, theory, and culture of this art form and asks questions about film texts themselves: modes of production (including everything from filmmakers' aesthetic choices to the role of the global economy); historical, national, and cultural contexts; and spectators and audiences. Questions of gender, race, sexuality, and nationality, in all of these areas, have been central to Film Studies almost since its inception and continue to shape much of the work in the field. While the program emphasizes film history, criticism, and theory, students also have opportunities to explore film/video production.

Students majoring in Film Studies take upper-division courses in film history and film theory, as well as in at least three of five general areas of study. Students also develop a thematic emphasis, in consultation with an adviser, that draws on courses from at least two different departments/programs and that allows them to pursue their particular interests within the field of Film Studies. Students have the option of completing a senior thesis (either a written paper or an original film/video) within this emphasis.

**Career Alternatives.** The A.B. degree in Film Studies prepares students for a variety of careers in media industries: for example, local and national film and television production companies, local television newsrooms, community television stations, computer graphic companies, advertising and marketing companies, public relations departments, and film distribution companies. Students wishing to pursue graduate work will be prepared to go on in film studies, as well as a variety of other fields that draw on interdisciplinary study: for example, American studies, English, literatures and languages, drama, communication, computer science, cultural studies, women and gender studies, and ethnic studies programs. Many film students also choose to go on to law school, and the analytical skills, writing abilities, and familiarity with theoretical thought developed through the film major prepare them well for the study and practice of law.

### A.B. Major Requirements:

UNITS

#### Preparatory Subject Matter .....20-40

Film Studies 1 ..... 4

A four-course sequence in a single language or equivalent ..... 0-20

One course from: African American and African Studies 15, 50; American Studies 1A, 21, 30; Art History 5; Art Studio 30;

Chicana/o Studies 50, 60; Design 1;

French 50; Humanities 60; Italian 50;

Japanese 25; Native American Studies 32;

Textiles and Clothing 7; Women's Studies 20, 25

..... 4

One course from: African American and African Studies 10, 15, 50; Asian

American Studies 1, 2; Chicana/o Studies 10, 50, 60; Native American Studies 1,

10, 32, 33; Women's Studies 20, 25, 50,

70, 80

..... 4

Two courses from: Art History 1A, 1B, 1C,

1D; Asian American Studies 2; Chinese 10,

11; Classics 10; Comparative Literature 3,

4, 5, 6, 7; Dramatic Art 1, 20; English 43,

44; German 48; History 4C, 10C, 17B, 72B; Humanities 5, 6; Japanese 10; Music 10, 28; Native American Studies 33; Russian 41, 42 ..... 8  
Note: One of these two courses may be from Design 15, 16 or Dramatic Art 10, 21A, 21B, 24.

### **Depth Subject Matter ..... 36-40**

One course from: English 161A, 161 B or Film Studies 124 ..... 4  
One course from: English 162; Film Studies 127; Philosophy 127; Women and Gender Studies 162 ..... 4  
One course each from three of the following topic areas: Cinematic Traditions and Movements, Visual and Popular Culture, Gender/Sexuality/Class, Race/Ethnicity/Class, Production and Performance ..... 12  
A current list of approved classes is available from the Advising office and from the faculty adviser.  
16-20 units in one of the two breadth areas not used to satisfy the breadth requirement, or development of a thematic area in consultation with a faculty adviser ..... 16-20  
Qualified students who complete 20 units and have an overall GPA of 3.500 may choose the senior thesis option (194H-196H) for 8 of those 20 units.  
No course may be counted for more than one requirement for the major.

### **Total Units for the Major ..... 56-80**

**Major Adviser.** Information on the current Academic Advisers can be obtained by contacting the Arts Group Advising Center at 530-752-0890.

### **Minor Program Requirements:**

	UNITS
<b>Film Studies ..... 24</b>	
Film Studies 1 ..... 4	
Upper division courses selected from the following list, with no more than two courses from any one category..... 20	
(a) <i>Problems and Themes in Cinema:</i> Anthropology 136, Classics 102, Dramatic Art 115, English 160, 161A, 161B, Film Studies 124, 125, Women's Studies 162	
(b) <i>Cinema, Nation and Nationality:</i> German 119, 142, Film Studies 176A, 176B, Italian 150, Japanese 106, Russian 129, Spanish 148	
(c) <i>Film and Social Identities:</i> African American and African Studies 170, 171, Film Studies 120, Jewish Studies 120, Women's Studies 160, 164	
(d) <i>Film/Video Production:</i> Art Studio 116, 117, 150	
(e) <i>Popular and Visual Culture:</i> American Studies 130, 132, 133, 139, Art Studio 150, Communication 140, Political Science 165, Textiles and Clothing 107, Women's Studies 139	

**Minor Adviser.** Information on the current Academic Advisers can be obtained by contacting the Arts Group Advising Center at 530-752-0890.

### **The Technocultural Studies Major Program**

Major is closed to new students beginning 2015-2016.

Interested students are encouraged to explore the Cinema and Digital Media major which incorporates many of the courses previously offered through Technocultural Studies.

### **The Program**

The Technocultural is an interdisciplinary integration of current research in cultural history and theory with innovative hands-on production in digital media and "low-tech." It focuses on the fine and performing arts, media arts, community media, literature and cultural studies as they relate to technology and sci-

ence. Backed by critical perspectives and the latest forms of research and production skills, students enjoy the mobility to explore individual research and expression, project-based collaboration and community engagement.

Preparatory coursework involves a solid introduction to the history, ideas and current activities of Technocultural studies, along with technical skill courses enabling individuals to get up to speed on digital imaging, sound, digital video and Web production, among other skills. For depth subject matter, students in the major select to concentrate on either critical studies or creative production emphases, and work toward a final project. All majors are required to take at least one course from another department or program relevant to their area of study, upon approval from Technocultural Studies, and may take more courses with approval. The final project for the critical studies emphasis consists of a substantial research paper. The final project for the creative production emphasis will be a major individual or collaborative work. Plans for final projects must be approved in advance.

### **Career Paths**

Technocultural Studies is designed to prepare graduates to be highly adaptable, collaborative, multi-skilled, and current with the latest developments. Perhaps most importantly is self-motivation: students do best when fueled by their own passions and plot their own directions, while held to very high standards. We feel this is the best education for living and working in a complex and rapidly changing world. Final research papers and creative production portfolios will provide graduate school admissions committees, employers, or clients with tangible evidence of Technocultural Studies graduates' track records and talents.

### **A.B. Major Requirements:**

	UNITS
<b>Preparatory Subject Matter ..... 28</b>	
Technocultural Studies 1, 2, 4, 5, 6, 7A-E ..... 24	
American Studies 1A or 5 ..... 4	
<b>Depth Subject Matter ..... 44</b>	
Technocultural Studies 190, 191 ..... 8	
Production emphasis ..... 32	
Choose five from production based Technocultural Studies: 100, 101, 103, 104, 110, 111, 112, 113, 121, 122, 123, 192	
Plus two from Technocultural Studies: 120, 150, 151, 152, 153, 154, 155, 158, 159	
Plus a four-unit class from another department or program relevant to the student's area of concentration, as approved by Technocultural Studies.	
Studies emphasis ..... 32	
Choose two from production based Technocultural Studies: 100, 101, 103, 104, 110, 111, 112, 113, 121, 122, 123, 192	
Plus five from Technocultural Studies: 120, 150, 151, 152, 153, 154, 155, 158, 159	
Plus a four-unit class from another department or program relevant to student's area of concentration, as approved by Technocultural Studies.	
Technocultural Studies 198 ..... 4	

### **Total Units for the Major ..... 72**

**Major Adviser.** Information on the current Academic Advisers can be obtained by contacting the Arts Group Advising Center at 530-752-0890.

### **Courses in Cinema & Technocultural Studies (CTS)**

#### **Lower Division**

##### **12. Introduction to Media Computation (4)**

Lecture—3 hours; discussion/laboratory—1 hour. Introduction to key computational ideas necessary to understand and produce digital media. Fundamentals of programming are covered as well as analysis

of how media are represented and transmitted in digital form. Aimed primarily at non-computer science students. (Same course as Engineering: Computer Science 012.) GE credit: ArtHum or SciEng | AH or SE, VL—W. (W.) Neff

### **20. Filmmaking Foundations (5)**

Lecture—3 hours; laboratory—3 hours; film viewing—2 hours; project. Prerequisite: recommended: course 5/Technocultural Studies 5 and/or Film Studies 1. Introduction to filmmaking concepts, principles, and methods. Hands-on exercises build critical and creative capacities. Emphasis on form, content and the historical dialectic between classical narrative filmmaking conventions and artists' challenges to these conventions. Weekly Lab, Lab Preparation, and Evening Screening. GE credit: ArtHum | AH, VL—F. (F.) Wyman

### **40A. Media History 1, Gutenberg to Oppenheimer (4)**

Lecture—3 hours; discussion—1 hour; film viewing—2 hours; extensive writing. History of Media to 1945, with particular focus on mechanically reproduced mass media technologies including the printing press, the newspaper, photography, cinema, radio and early computing technology. Analysis of inter-related cultural and political topics. (Same Course As: Science and Technology Studies 40A.) GE credit: ArtHum or SocSci | AH or SS, OL, VL, WE—F. (F.)

### **40B. Media History 2 1945-Present (4)**

Lecture—3 hours; discussion—1 hour; film viewing—2 hours; extensive writing. Prerequisite: course 40A. History of media from 1945 to present, with particular focus on the development of the computer, digital network and internet technologies in the context of other media infrastructures like radio, television and satellite networks. Analysis of inter-related cultural/political topics. (Same course as Science & Technology Studies 40B.) GE credit: ArtHum or SocSci | AH or SS, OL, VL, WE—F. (F.)

### **41A. History of Cinema from 1895 to 1945 (4)**

Lecture—2 hours; discussion—1 hour; film viewing—3 hours; extensive writing. Examination of the cultural context of the emergence of cinema. Discussion of cinema as a product of the age of industrialization and conquest, as well as an element of urban culture, and mass transportation. GE credit: ArtHum | AH, OL, VL, WC, WE.

### **41B. History of Cinema from 1945 to the present (4)**

Lecture—2 hours; discussion—1 hour; film viewing—3 hours; extensive writing. Examination of cinema in the postwar period. Study of world cinema trends and the economic and socio-political conditions enabling innovative work in the film industry. GE credit: ArtHum | AH, OL, VL, WC, WE.

### **Upper Division**

#### **116. Design on Screen (4)**

Lecture/discussion—3 hours; film viewing—2 hours. Analysis of the contribution of outstanding designers for cinema, television and filmed entertainment. Study of diverse aesthetic theories of production design and art direction, costume design, or cinematography. Introductory principles and practice, history. May be repeated two times for credit when topic differs. (Same course as Dramatic Art 116.) Offered irregularly. GE credit: ArtHum | AH, VL—Iacovelli, Morgan

#### **124E. Costume Design for Film (4)**

Lecture/discussion—4 hours. Prerequisite: for Dramatic Art majors; Dramatic Art 24 or 124D or consent of instructor. Theory and practice of the art and business of film costume design. Script analysis, costume research, developing design concepts, budgeting, and current production practices and methods. Execution of designs for period and contemporary films. Viewing of current films. (Same course as Dramatic Art 124E.) GE credit: ArtHum | AH, OL, VL—W. (W.) Morgan

**146A. Modern Iranian Cinema (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: upper-division standing, or consent of instructor. Iranian cinema of the 20th century in the context of profound cultural and social changes in Iran especially since the Iranian Revolution. Productions by representative directors such as Kiarostami, Makhmalbaf, Bahram Beizaie are included. Knowledge of Persian not required. (Same course as Middle East/South Asia Studies 131A.) Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, OL, VL, WC, WE.—(S.)

**147A. Chinese Film (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: History 9A or any course on traditional China; upper division standing. English language survey of Chinese film, from its inception to the end of the twentieth century. Chinese films as important texts for understanding national, transnational, racial, gender, and class politics of modern China. (Same course as Chinese 101.) GE credit: ArtHum, Div | AH, VL, WC.—S. (S.) Chen

**148B. Japanese Literature on Film (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Survey of films based on works of Japanese literature, emphasis on pre-modern and early modern texts. Introduction to major directors of Japan, with a focus on cinematic adaptation. Lectures and readings in English. Films in Japanese with English subtitles. (Same course as Japanese 156.) Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.—(S.) Sorensen

**150. Media Theory (5)**

Lecture—2 hours; discussion—1 hour; film viewing—3 hours; extensive writing. Critical and theoretical approaches to the emergence of new technologies since the invention of photography. Examine various approaches to media (formalist, semiotic, structuralist, Frankfurt School, cybernetics, visual and game theory). (Same course as Science and Technology Studies 151.) GE credit: AH or SS, OL, VL, WE.

**162. Surveillance Technologies and Social Media (4)**

Lecture—3 hours; film viewing—3 hours; term paper. Prerequisite: Technocultural Studies 1 or course 20. Study of the ubiquitous presence of CCTV, face recognition software, global tracking systems, biosensors, and data mining practices that have made surveillance part of our daily life. Exploration of the boundary between security and control, information and spying. (Same course as Science & Technology Studies 162.) Offered in alternate years. GE credit: ACGH, AH or SS, OL, VL, WE.—Ravetto

**172. Video Games and Culture (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: Technocultural Studies 1 or English 3 or Science and Technology Studies 1 or equivalent. Critical approaches to the study of video games, focusing on formal, historical, and cultural modes of analysis. History of software and hardware in North American and global contexts. Relations of games to society, politics, economics, literature, media, and the arts. (Same course as Science and Technology Studies 172 and English 172.) GE credit: ArtHum or SocSci | ACGH, AH or SS, VL

**174. Acting for Camera (4)**

Lecture/laboratory—6 hours. Prerequisite: consent of instructor. Analysis and practice of acting skills required for camera work and digital media. May be repeated eight times for credit when instructor differs. (Same course as Dramatic Art 174.)—S. (S.) Anderson, Merlin

**Courses in Film Studies (FMS)****Lower Division****1. Introduction to Film Studies (4)**

Lecture—2 hours; discussion—1 hour; film viewing—3 hours. Analysis of film form and narrative, including cinematography, editing, and sound. Issues in film studies, including authorship, stardom, race, gender, class, and cultural identity. Includes

introduction to selected cinematic movements and national film traditions. GE credit: ArtHum, Wrt | AH, OL, VL, WC, WE.—F, W, S. (F, W, S.)—Fisher, Lu, Ravetto-Biagioli, Smoodin

**45. Vampires and Other Horrors in Film and Media (4)**

Lecture—2 hours; discussion—1 hour; film viewing—3 hours. History of representations of vampires and horror generally from the 19th through 21st centuries. Emphasis on transnational history of the horror genre; psychologies of horror effects; issues of race, gender, and class; intersections with prejudice, medicine, modernity. (Same course as German 45.) Offered in alternate years. GE credit: ArtHum | ACGH, AH, DD, OL, VL, WC, WE.—W, S. Fisher

**90X. Lower Division Seminar (4)**

Seminar—4 hours. Prerequisite: lower division standing and consent of instructor. Study of a special topic in film studies in a small class setting. May be repeated for credit if topic differs. (P/NP grading only.)—F, W, S. (F, W, S.)

**92. Internship (1-12)**

Internship—3-36 hours. Supervised internship off and on campus in areas of Film Studies. May be repeated for credit. (P/NP grading only.)

**98. Directed Group Study (1-5)**

(P/NP grading only.)

**99. Special Study for Undergraduates (1-5)**

(P/NP grading only.)

**Upper Division****120. Italian-American Cinema (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 1. Exploration of representations of Italian-American identity in American (U.S.) cinema. Analysis of both Hollywood and independently produced films, especially as they represent ethnicity, gender, and social class of Italian Americans. Not open for credit to students who have completed Humanities 120. GE credit: ArtHum, Div, Wrt | ACGH, AH, DD, OL, VL, WC, WE.—S. (S.) Heyer-Caput, Schiesari

**121. New Italian Cinema (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 1 and upper-division standing, or consent of instructor. Italian cinema of the 21st century in the context of profound cultural and social changes in Italy since World War II. Productions by representative directors such as Amelio, Giordana, Moretti, Muccino are included. Knowledge of Italian not required. (Same course as Italian 121.) Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, OL, VL, WC, WE.—S. Heyer-Caput

**121S. New Italian Cinema (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 1 and upper-division standing, or consent of instructor. Italian cinema of the 21st century in the context of profound cultural and social changes in Italy since World War II. Productions by representative directors such as Amelio, Giordana, Moretti, Muccino are included. Knowledge of Italian not required. (Same course as Italian 121S.) GE credit: ArtHum, Div, Wrt | AH, OL, VL, WC, WE.—F, S. (F, S.) Heyer-Caput

**124. Topics in U.S. Film History (4)**

Lecture—3 hours; film viewing—3 hours. Prerequisite: course 1. Study of an aspect of American film history (such as the silent era; the studio system; U.S. avant-garde cinema), including the influences of technological, economic, regulatory, cultural, and artistic forces. Not open for credit to students who have completed Humanities 124 unless topic differs. May be repeated two times for credit if topic differs. GE credit: ArtHum, Wrt | ACGH, AH, DD, OL, VL, WE.—S. (S.) Clover, Fisher, Simon, Smoodin

**125. Topics in Film Genres (4)**

Lecture—3 hours; film viewing—3 hours. Prerequisite: course 1. A study of one or more of the film genres (such as the documentary, the musical, film noir, screwball comedy, or the western), including genre theory and the relationship of the genre(s) to

culture, history, and film industry practices. Not open for credit to students who have completed Humanities 125 unless topic differs. May be repeated two times for credit if topic differs. GE credit: ArtHum, Wrt | AH, OL, VL, WE.—W. (W.) Clover, Constable, Fisher, Ravetto-Biagioli, Simon, Smoodin

**127. Film Theory (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 1 or consent of instructor. Survey of the conceptual frameworks used to study film (including semiotics, psychoanalysis, spectatorship, auteur, genre and narrative theories). Historical survey of major film theorists. GE credit: ArtHum, Wrt | AH, OL, VL, WC, WE.—S. (S.) Fisher, Ravetto-Biagioli

**129. Russian Film (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: completion of Subject A requirement. History of Russian film; film and social revolution, the cult of Stalin, dissident visions; film and the collapse of the Soviet empire; gender and the nation in Russian film. Course taught in English; films are in Russian with English subtitles. (Same course as Russian 129.) Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.—W.

**142. New German Cinema (4)**

Lecture/discussion—3 hours; extensive writing. German filmmakers of the 1960s-1980s such as Fassbinder, Herzog, Syberberg, Brückner, Schlöndorff, Kluge, Wenders. Knowledge of German not required. May be repeated for credit with consent of instructor. (Same course as German 142) GE credit: ArtHum, Wrt | AH, OL, VL, WC, WE.—F. (F.) Fisher

**176A. Classic Weimar Cinema (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: Humanities 1. German Weimar (1919-1933) cinema. Fritz Lang, F.W. Murnau, and G.W. Pabst among others. Influence on world-wide (esp. Hollywood) film genres such as film noir, horror, science fiction, and melodrama. Not open for credit to students who have completed Humanities 176. (Same Course as German 176A.) Offered in alternate years. GE credit: ArtHum, Wrt | AH, OL, VL, WC, WE.—F. Fisher

**176B. Postwar German Cinema (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 1. Exploration of German cinema from 1945 to 1980, when the Nazi past was a central theme. Includes study of postwar "rubble films," escapist "homeland films," and New German Cinema of the 1970s (including films by Fassbinder, Kluge, Syberberg, and Herzog). Not open for credit to students who have completed Humanities 177. Offered in alternate years. GE credit: ArtHum, Wrt | AH, OL, VL, WC, WE.—W.

**189. Special Topics in Film Studies (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 1, upper division standing, or consent of instructor. Group study of a special topic in film, focusing on a national tradition, a major filmmaker, or a specific era. May be repeated three times for credit. GE credit: ArtHum, Wrt | AH, OL, VL, WE.—F, S. (F, S.) Clover, Constable, Fisher, Heyer-Caput, Lu, Simon, Smoodin

**190X. Upper Division Seminar (4)**

Seminar—4 hours. Prerequisite: upper division standing or consent of instructor. Study of a special topic in film studies in a small class setting. May be repeated for credit if topic differs. (P/NP grading only.)—F, W, S. (F, W, S.)

**192. Internship (1-12)**

Supervised internship off and on campus in areas of Film Studies. May be repeated for credit. (P/NP grading only.)

**194H. Special Study for Honors Students (1-5)**

Variable—1-5 hours; independent study—3-15 hours. Prerequisite: senior standing; GPA of at least 3.500; consent of instructor. Guided research on a topic in Film Studies in preparation for the writing of an honors thesis in course 195H or the creation of

an honors project in course 196H. May be repeated two times for credit. (P/NP grading only.) —F, W, S. (F, W, S.)

### **195H. Honors Thesis (1-5)**

Independent study—3-15 hours. Prerequisite: course 194H and consent of instructor; GPA of at least 3.500; senior standing. Writing of an honors thesis on a topic in Film Studies under the direction of a faculty member. May be repeated two times for credit. (P/NP grading only.) GE credit: AH, VL, WE.—F, W, S. (F, W, S.)

### **196H. Honors Project (1-5)**

Project—3-15 hours. Prerequisite: course 194H and consent of instructor; GPA of at least 3.500; senior standing. Creation of an honors film, video, or mixed-media project under the direction of a faculty member. May be repeated two times for credit. (P/NP grading only.) GE credit: AH, VL, WE.—F, W, S. (F, W, S.)

### **197T. Tutoring in Film Studies (1-5)**

Tutorial—3-15 hours. Prerequisite: consent of program director. Leading of small voluntary discussion groups affiliated with one of the Program's regular courses. May be repeated for credit. (P/NP grading only.)

### **198. Directed Group Study (1-5)**

(P/NP grading only.)

### **199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.)

## **Professional**

### **396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit (S/U grading only.)

## **Courses in Technocultural Studies (TCS)**

### **Lower Division**

#### **1. Introduction to Technocultural Studies (4)**

Lecture—3 hours; extensive writing. Contemporary developments in the fine and performing arts, media arts, digital arts, and literature as they relate to technological and scientific practices. GE credit: ArtHum | AH, VL, WE.—Ostertag

#### **5. Media Archaeology (4)**

Lecture/discussion—3 hours; term paper. Evolution of media technologies and practices beginning in the 19th Century as they relate to contemporary digital arts practices. Special focus on the reconstruction of the social and artistic possibilities of lost and obsolete media technologies. GE credit: ArtHum or SciEng | AH or SE, VL, WE.

#### **7A. Technocultural Workshop; Digital Imaging (1)**

Seminar—1 hour. Workshops in technocultural digital skills; Digital Imaging. Offered irregularly. GE credit: VL.—F, Su. (F, Su.)

#### **7B. Technocultural Workshop; Digital Video (1)**

Seminar—1 hour. Workshops in technocultural digital skills; Digital Video. Offered irregularly. GE credit: VL.—F, Su. (F, Su.)

#### **7C. Technocultural Workshop; Digital Sound (1)**

Seminar—1 hour. Workshops in technocultural digital skills; Digital Sound. Offered irregularly. GE credit: VL.—F, Su. (F, Su.)

#### **7D. Technocultural Workshop; Web Design (1)**

Seminar—1 hour. Workshops in technocultural digital skills; Web Design. GE credit: VL.

#### **7E. Technocultural Workshop; Topics in Digital Production (1)**

Seminar—1 hour. Workshops in technocultural digital skills; Topics in Digital Production. May be repeated for credit. Offered irregularly. GE credit: VL.—S, Su. (S, Su.)

### **Upper Division**

#### **100. Experimental Digital Cinema I (4)**

Lecture/discussion—3 hours; laboratory—3 hours. Experimental approaches to the making of film and video in the age of digital technologies. Opportunities for independent producers arising from new media. Instruction in technical, conceptual and creative skills for taking a project from idea to fruition. GE credit: VL.—Wyman

#### **101. Experimental Digital Cinema II (4)**

Lecture/discussion—3 hours; laboratory—3 hours. Prerequisite: course 100. Continuation of course 100 with further exploration of digital cinema creation. Additional topics include new modes of distribution, streaming, installation and exhibition. GE credit: VL.—Wyman

#### **103. Interactivity and Animation (4)**

Lecture/discussion—3 hours; laboratory—3 hours. Fundamentals of creating interactive screen-based work. Theories of interactivity, linear versus non-linear structures, and audience involvement and participation. Use of digital production tools to produce class projects. GE credit: VL.—Drew

#### **104. Documentary Production (4)**

Lecture/discussion—3 hours; project. Prerequisite: course 7B or equivalent proficiency, course 155. Traditional and new forms of documentary, with focus on technocultural issues. Skills and strategies for producing work in various media. Progression through all stages of production, from conception through post-production to critique. GE credit: VL.—Drew, Wyman

#### **110. Object-Oriented Programming for Artists (4)**

Lecture/discussion—3 hours; laboratory—3 hours. Prerequisite: course 1. Introduction to object-oriented programming for artists. Focus on understanding the metaphors and potential of object-oriented programming for sound, video, performance, and interactive installations. GE credit: VL.—S. Ostertag

#### **111. Community Media Production (4)**

Lecture/discussion—3 hours; laboratory—3 hours. Use of video and new media tools to address social issues among neighborhood and community groups. Students will use basic video, sound, and lighting techniques as they work with local groups in a group video project. GE credit: VL.—S. (S.) Ostertag

#### **112. New Radio Features and Documentary (4)**

Lecture/discussion—3 hours; laboratory—3 hours. New feature and documentary production for radio and other audiophonic media, including audio streaming Web sites and installation. Emphasis on new and experimental approaches to audio production for broadcast on community radio and in international arts programming.

#### **113. Community Networks (4)**

Lecture/discussion—3 hours; laboratory—3 hours. Impact and implications of computer-based networks in community, civic, and social life. Subjects may include community-access computer sites, neighborhood wireless networks, the digital divide, open-source software, and citizen action.

#### **115. Electronics for Artists (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 1. Creative application of electronic technology relevant to media and fine arts involving both electronic principles and hands-on application.—S. (S.) Drew

#### **120. History of Sound in the Arts (4)**

Lecture—3 hours; term paper. Prerequisite: course 1. A survey of the use of sound, voice, noise, and modes of listening in the modernist, avant-garde, and experimental arts, from the late 19th Century to the present. Focus on audiophonic and audiovisual technologies.—Kahn

### **Cinema and Digital Media**

#### **121. Introduction to Sonic Arts (4)**

Lecture/discussion—3 hours; lecture/laboratory—3 hours. Prerequisite: course 7C. Introduction to the use of sound within the arts. Techniques and aesthetics of experimental contemporary practices. Creation of original sound works.—Ostertag

#### **122. Intermediate Sonic Arts (4)**

Lecture/discussion—3 hours; laboratory—3 hours. Prerequisite: course 121, 170C. Techniques of recording, editing, mixing, and synthesis to combine voice, field recordings, and electronic signals. Incorporating live, recorded, and found sounds to create multidimensional stories. Presentation of live performances, audio recordings, and sound installations.—Ostertag

#### **123. Sight and Soundtrack (4)**

Lecture/discussion—3 hours; laboratory—3 hours. Prerequisite: courses 7C, 170C. The use of sound to articulate, lend mood or subconsciously underscore visual, environmental or performative situations, combining music, voice, sound effects and other noises to create sound designs that enhance, alter or support action and movement.—Ostertag

#### **125. Advanced Sound: Performance and Improvisation (4)**

Workshop—3 hours; practice—3 hours. Prerequisite: courses 121 and 122 or consent of instructor. Culmination of TCS sound courses. Class will focus on performance and improvisation, culminating in a final public performance. Students will be expected to do extensive reading and rehearsal outside of class time.—S. (S.) Ostertag

#### **130. Fundamentals of 3D Computer Graphics (4)**

Lecture—3 hours; laboratory—3 hours. A foundation course that teaches students the theory of three dimensional computer graphics, including modeling, rendering and animation. Development of practical skills through the use of professional software to create computer graphics.—F. (F.) Neff

#### **131. Character Animation (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 130 or consent of instructor. The art of character animation in three dimensional computer animation. Movement theory, principles of animation, animation timing. Development of technical and practical skills.—S. (S.) Neff

#### **150. Introduction to Theories of the Technoculture (4)**

Lecture/discussion—3 hours; extensive writing. Major cultural theories of technology with emphasis on media, communications, and the arts. Changing relationships between technologies, humans, and culture. Focus on the evolution of modern technologies and their reception within popular and applied contexts. GE credit: ArtHum | VL.—Dyson

#### **151. Topics in Virtuality (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 1. Social, political, economic, and aesthetic factors in virtual reality. Artificial environments, telepresence, and simulated experience. Focus on contemporary artists' work and writing. GE credit: VL.—Dyson

#### **152. New Trends in Technocultural Arts (4)**

Lecture/discussion—3 hours; term paper. Current work at the intersection of the arts, culture, science, and technology including biological and medical sciences, computer science and communications, and artificial intelligence and digital media. GE credit: VL.—Dyson

#### **153. Concepts of Innovative Soundtracks (4)**

Lecture/discussion—3 hours; term paper. Innovative and unconventional soundtracks in cinema, media arts, and fine arts. Introduction to basic analytical skills for understanding sound-image relationships.—Kahn

#### **154. Outsider Machines (4)**

Lecture/discussion—3 hours; term paper. Invention, adaptation and use of technologies outside the mainstream, commonsense, and the possible. Topics

include machines as metaphor and embodied thought, eccentric customizing and fictional technologies. GE credit: VL.

#### **155. Introduction to Documentary Studies (4)**

Lecture/discussion—3 hours; term paper. Recent evolution of the documentary. The personal essay film; found-footage/appropriation work; non-linear, multi-media forms; spoken word; storytelling; oral history recordings; and other examples of documentary expression. GE credit: ArtHum | ACGH, AH, DD, VL.—F. (F.) Drew

#### **158. Technology and the Modern American Body (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 and either American Studies 1A or 5. The history and analysis of the relationships between human bodies and technologies in modern society. Dominant and eccentric examples of how human bodies and technologies influence one another and reveal underlying cultural assumptions. (Same course as American Studies 158.) GE credit:

ArtHum | ACGH, AH, WE.—de la Pena

#### **159. Media Subcultures (4)**

Lecture/discussion—3 hours; term paper. Relationships between subcultural groups and media technologies. Media as the cohesive and persuasive force of subcultural activities. List-servs, Web sites, free radio, fan 'zines, and hip-hop culture. GE credit: Div | ACGH, VL—W. (W.) Drew

#### **160. Ghosts of the Machine: How Technology Rewires our Senses (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Historical, aesthetic and critical approaches to how information technologies produced ghost effects or a sense of terror in response to new media like the photograph, gramophone, film, typewriter, computer, Turing Machine. Focus on technological media transforms sense perception. (Same course as Science and Technology Studies 160.) Offered in alternate years. GE credit: ArtHum or SocSci | ACGH, AH or SS, VL, WE.—Ravetto-Biagioli

#### **170A. Advanced Technocultural Workshop (1)**

Seminar—1 hour. Prerequisite: course 7A or the equivalent. Workshop in advanced technocultural digital skills: Digital Imaging. GE credit: VL.

#### **170B. Advanced Technocultural Workshop (1)**

Seminar—1 hour. Prerequisite: course 7B. Workshop in advanced technocultural digital skills: Digital Video. GE credit: VL.

#### **170C. Advanced Technocultural Workshop (1)**

Seminar—1 hour. Prerequisite: course 7C. Workshop in advanced technocultural digital skills: Digital Sound. GE credit: VL.

#### **170D. Advanced Technocultural Workshop (1)**

Seminar—1 hour. Prerequisite: course 7D. Workshop in advanced technocultural digital skills: Web Design. GE credit: VL.

#### **170E. Advanced Technocultural Workshop (1)**

Seminar—1 hour. Prerequisite: consent of instructor. Workshop in advanced technocultural digital skills: Topics in Digital Production. GE credit: VL.

#### **175. Small Scale Film Production (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: consent of instructor. Lecture and intensive workshop teaching small-scale film production. Appointments as a(n) director, director of photography, actor, writer, lighting designer, sound designer and other critical positions are used to produce and submit a short film to a film festival. (Same course as Dramatic Art 175.) May be repeated two times for credit.—S. (S.) Anderson, Drew

#### **190. Research Methods in Technocultural Studies (4)**

Lecture/discussion—3 hours; project. Introduction to basic research methods for Technocultural Studies: electronic and archived images, sounds and data, satellite downlinking, radiowave scanning, and oral histories. GE credit: VL, WE.—Drew

#### **191. Writing Across Media (4)**

Lecture/discussion—3 hours; extensive writing. Introduction to experimental approaches to writing for different media and artistic practices. How written texts relate to the images, sounds, and performances in digital and media production. GE credit: WE.—Jones

#### **192. Internship (1-4)**

Internship—3-12 hours. Supervised internship on or off campus in area relevant to Technocultural Studies. May be repeated two times for credit. (P/NP grading only)

#### **197T. Tutoring in Technocultural Studies (1-5)**

Tutorial—3-15 hours. Prerequisite: consent of instructor. Undergraduates assist the instructor by tutoring students in one of the department's regularly scheduled courses. May be repeated for credit up to eight units. (P/NP grading only)—F, W, S. (F, W, S.)

#### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

#### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. Guided study with faculty member in independent scholarly activity. May be repeated for credit up to eight units. (P/NP grading only.)

## **Classics**

(College of Letters and Science)

Rex Stem, Ph.D., Program Director

**Department Office.** Classics Program

215 Sproul Hall;  
530-752-0835; <http://classics.ucdavis.edu>

#### **Faculty**

Emily Albu, Ph.D., Professor  
Tim Brelinski, Ph.D., Lecturer  
Catherine Chin, Ph.D., Professor  
Ralph Hexter, Ph.D., Professor  
Valentina Popescu, Ph.D., Lecturer  
John Rundin, Ph.D., Lecturer  
Carey Seal, Ph.D., Associate Professor  
Rex Stem, Ph.D., Associate Professor  
Anna Uhlig, Ph.D., Assistant Professor  
Colin Webster, Ph.D., Assistant Professor  
Emeriti Faculty  
Don Abbott, Ph.D., Professor Emeritus (*English*)  
Seth L. Schein, Ph.D., Professor Emeritus  
(*Comparative Literature*)  
David A. Traill, Ph.D., Professor Emeritus  
Wesley E. Thompson, Ph.D., Professor Emeritus

#### **Emeriti Faculty**

Don Abbott, Ph.D., Professor Emeritus (*English*)  
Seth L. Schein, Ph.D., Professor Emeritus  
(*Comparative Literature*)  
David A. Traill, Ph.D., Professor Emeritus  
Wesley E. Thompson, Ph.D., Professor Emeritus

#### **Affiliated Faculty**

Manar Al-Shatarat, M.A., Lecturer  
Poonam Chauhan, M.A., Lecturer  
Galia Franco, M.A., Lecturer  
Shayma Hassouna, M.A., Lecturer  
Shennan Hutton, Ph.D., Lecturer  
Noha Radwan, Ph.D., Associate Professor  
(*Comparative Literature*)  
Lynn E. Roller, Ph.D., Professor (*Art History*)  
Jocelyn Sharlet, Ph.D., Associate Professor  
(*Comparative Literature*)

## **The Major Program**

Classical Civilization is an interdisciplinary major that examines the ancient Mediterranean cultures of Greece, Rome and the Near East, with courses offered on the languages, history, literature, religions, myths, art and archaeology of these societies, their achievements in rhetoric and philosophy, and their political and social institutions. Minor programs in Classical Civilization, Greek, and Latin, and many General Education courses are also offered.

**The Program.** The major has two tracks: (1) Classical and Mediterranean Civilizations, and (2) Classical Languages and Literatures. The core of both major tracks consists of two years of Latin or Greek, the introductory sequence on the ancient Mediterranean world (Classics 1, 2, 3), the advanced seminar (Classics 190), and a number of electives. The Classical and Mediterranean Civilization track allows students to choose their electives from a broadly balanced program in history, art and archaeology, literature, philosophy and rhetoric. The Classical Languages and Literatures track focuses more intensively on language and literature, requiring the study of two languages and allowing fewer electives. Students planning to go on to graduate work in Classics should take Track 2 and study as much Latin and Greek as possible. They should make a point of talking to an adviser early in their undergraduate program. They are also advised to acquire a reading knowledge of French or German.

**Career Opportunities.** A degree in Classical Civilization represents a solid liberal arts education that provides an excellent foundation for a wide variety of careers. In the last twenty-five years, many majors have applied to law or medical schools and nearly all have been accepted. Additional career options include library and museum work, teaching, journalism, and graduate study in Classics, art, archaeology, history, literature, philosophy, and religion.

#### **Classical Civilization**

#### **A. B. Major Requirements:**

UNITS
-------

#### **Classical and Mediterranean Civilizations track**

#### **Preparatory Subject Matter ..... 26-27**

Latin 1-2-3, or Greek 1-2-3 .....	15
Two courses from: Classics 1, 2, 3 .....	8
One additional course from: Art History 1A; Classics courses 1 through 50; Comparative Literature 1; Philosophy 21; Religious Studies 21, 40 .....	3-4

#### **Depth Subject Matter ..... 40**

Upper division courses in Latin or Greek .....	12
Classics 190 .....	4
Six additional courses selected from at least three of the following groups .....	24
Of these 24 units, at least 12 must be in Latin, Greek, or Classics.	

(a) <i>Literature and Rhetoric</i> : Additional upper division courses in Latin, Greek and Hebrew; Classics 102, 110, 140, 141, 142, 143	12
(b) <i>History</i> : History 102A, 111A, 111B, 111C; Religious Studies 102, 125	12
(c) <i>Art and Archaeology</i> : Classics 171, 172A, 172B, 173, 174, 175	12
(d) <i>Philosophy and Religion</i> : Classics 141, 150; Philosophy 143, 160, 161, 162; Political Science 118A; Religious Studies 141A, 141B, 141C	12

#### **Total Units for the Major ..... 66-67**

#### **Classical Languages and Literatures track**

#### **Preparatory Subject Matter ..... 34**

Latin 1-2-3 and Greek 1-2-3 .....	30
Classics 1, 2, or 3 .....	4

#### **Depth Subject Matter ..... 36**

Six upper division courses in the two chosen languages, with at least two courses in each language .....	24
--	----

Classics 190 .....	4
Two additional courses selected from any of the following groups .....	8
(a) <i>Literature and Rhetoric</i> : Additional upper division courses in Latin or Greek; Classics 102, 110, 140, 141, 142, 143	
(b) <i>History</i> : History 102A, 111A, 111B, 111C; Religious Studies 102, 125	
(c) <i>Art and Archaeology</i> : Classics 171, 172A, 172B, 173, 174, 175	
(d) <i>Philosophy and Religion</i> : Classics 141, 150; Philosophy 143, 160, 161, 162; Political Science 118A; Religious Studies 141A, 141B, 141C	
<b>Total Units for the Major .....</b>	<b>70</b>

**Major Advisers.** E. Albu, V. Popescu, C. Seal, A. Uhlig

### Minor Program Requirements:

The Department offers minors in Classical Civilization, Greek and Latin for those wishing to follow a shorter but formally recognized program of study in Classics.

#### UNITS

<b>Classical Civilization .....</b>	<b>20</b>
Classics 1, 2, or 3 .....	4
One upper division course in Latin or Greek .....	4
Two additional upper division courses in Classics, Latin or Greek .....	8
One additional upper division course selected from any of the groups (a) through (d) in the Classical Civilization major .....	4
<b>Greek.....</b>	<b>20</b>
Classics 1 or 2 .....	4
Three upper division courses in Greek .....	12
One additional upper division course in Classics, Latin, or Greek .....	4
<b>Latin.....</b>	<b>20</b>
Classics 3 .....	4
Three upper division courses in Latin.....	12
One additional upper division course in Classics, Latin, or Greek .....	4

**Honors Program.** Candidates for high or highest honors in Classical Civilization must write a senior honors thesis under the direction of a faculty member in Classics. Potential candidates for the honors program must enroll in Classics 194HA and 194HB, normally during the first two quarters of the senior year. Enrollment is limited to upper division students with a minimum of 135 units, and a 3.500 grade point average in courses in the Classical Civilization major. For further information, students should consult with the major adviser or program director. The requirements for the honors program are in addition to the regular requirements for the major in Classical Civilization.

**Graduate Study.** The Department offers a master's degree in Classics with emphasis on either Greek or Latin; however, admission into the graduate program has been suspended.

**Prerequisite credit.** Credit will not normally be given for a lower division course in Latin or Greek if it is the prerequisite of a course already successfully completed. Exceptions can be made by the Program Director only.

### Courses in Arabic, Classics, Greek, Hebrew, Hindi-Urdu, Latin, and Persian follow in alphabetical order.

### Courses in Arabic (ARB)

#### Lower Division

##### 1. Elementary Arabic 1 (5)

Lecture/discussion—5 hours. Introduction to basic Arabic. Interactive and integrated presentation of listening, speaking, reading, and writing skills, includ-

ing the alphabet and basic syntax. Focus on standard Arabic with basic skills in spoken Egyptian and/or one other colloquial dialect. GE credit: ArtHum | AH, WC. —F. (F.) Hassouna

##### 1A. Accelerated Intensive Elementary Arabic (15)

Lecture/discussion—15 hours. Special 12-week accelerated, intensive summer session course that combines the work of courses ARB 1, 2, and 3. Introduction to Modern Standard Arabic through development of all language skills in a cultural context with emphasis on communicative proficiency. Not open for credit to students who have completed course 1, 2, or 3. Offered irregularly. GE credit: ArtHum | AH, WC. —S. (S.) Sharlet

##### 2. Elementary Arabic 2 (5)

Lecture/discussion—5 hours. Prerequisite: course 1 or consent of instructor. Continuation of basic Arabic from course 1. Interactive and integrated presentation of listening, speaking, reading, and writing skills, including syntax. Focus on standard Arabic and limited use of spoken Egyptian and/or one other colloquial dialect. GE credit: ArtHum | AH, WC. —W. (W.) Hassouna

##### 3. Elementary Arabic 3 (5)

Lecture/discussion—5 hours. Prerequisite: course 2 or with consent of instructor. Continuation of introduction to basic Arabic from courses 1 and 2. Interactive and integrated presentation of listening, speaking, reading, and writing skills, including syntax. Focus on standard Arabic with limited use of spoken Egyptian and/or one other colloquial dialect. GE credit: ArtHum | AH, WC. —S. (S.) Hassouna

##### 21. Intermediate Arabic 21 (5)

Lecture/discussion—5 hours. Prerequisite: course 3 or with consent of instructor. Builds on courses 1, 2, and 3. Interactive and integrated presentation of listening, speaking, reading, and writing skills, including idiomatic expression. Focus on standard Arabic with limited use of Egyptian and/or one other colloquial dialect. GE credit: ArtHum | AH, WC. —F. (F.) Hassouna

##### 21C. Colloquial Egyptian Arabic (4)

Lecture/discussion—3 hours; lecture/laboratory—1 hour. Prerequisite: course 3 or consent of instructor. Continuation of the Colloquial Egyptian Arabic covered in the first year of Arabic; courses 1, 2, and 3. May be repeated one time for credit if instruction material changes. GE credit: ArtHum | AH. —F. (F., Su. (F., Su.) Hassouna, Radwan, Sharlet

##### 22. Intermediate Arabic 22 (5)

Lecture/discussion—5 hours. Prerequisite: course 21 or with consent of instructor. Continuation of course 21. Continuation of interactive and integrated presentation of listening, speaking, reading, and writing skills, including idiomatic expression. Focus on standard Arabic with limited use of Egyptian and/or one other colloquial dialect. GE credit: ArtHum | AH, WC. —W. (W.) Hassouna

##### 22C. Colloquial Egyptian Arabic (4)

Lecture/discussion—3 hours; lecture/laboratory—1 hour. Prerequisite: course 21C or consent of instructor. Continuation of the Colloquial Egyptian Arabic covered in first year of Arabic; courses 1, 2, and 3 and the first quarter of Colloquial Arabic course 21C. May be repeated one time for credit if instruction material changes. GE credit: ArtHum | AH. —W. (W., Su. (W., Su.) Hassouna, Radwan, Sharlet

##### 23. Intermediate Arabic 23 (5)

Lecture/discussion—5 hours. Prerequisite: course 22 or with consent of instructor. Continuation of courses 21 and 22. Interactive and integrated presentation of Arabic listening, speaking, reading, and writing skills, including idiomatic expression. GE credit: ArtHum | AH, WC. —S. (S.) Hassouna

##### 23C. Colloquial Egyptian Arabic (4)

Lecture/discussion—3 hours; lecture/laboratory—1 hour. Prerequisite: course 22C or consent of instructor. Continuation of the Colloquial Egyptian Arabic

covered in the first year of Arabic; courses 1, 2, and 3 and the preceding colloquial Arabic courses 21C and 22C. May be repeated one time for credit if instruction material changes. GE credit: ArtHum | AH. —S. (S., Su.) Hassouna, Radwan, Sharlet

#### Upper Division

##### 101A. Readings in Arabic: 600-1850 (4)

Discussion—3 hours; extensive writing. Prerequisite: course 123 or consent of instructor. Readings in Arabic. Poetry, prose literature, and selections from texts on religion, history, politics, science, philosophy and mysticism. Students can repeat the course one time if the instructor decides that they would benefit from additional practice working on the different selections from the same texts or if 50% or more of the texts are different. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, OL, WC, WE. —Radwan, Sharlet

##### 121. Advanced Arabic (4)

Lecture/discussion—3 hours; term paper. Prerequisite: course 23 or consent of instructor. Review, refinement, and development of skills learned in intermediate Arabic through work with texts, video, and audio on cultural and social issues. Integrated approach to reading, writing, listening, speaking primarily standard Arabic, with limited use of one colloquial dialect. May be repeated two times for credit based on different readings. GE credit: ArtHum | AH, WC. —F. (F.) Radwan, Sharlet

##### 122. Advanced Arabic (4)

Lecture/discussion—3 hours. Prerequisite: course 121 or permission of instructor. Continuation of course 121. Further development of advanced skills in reading, listening, writing, and speaking standard Arabic through work with texts, video, and audio on cultural and social issues. Limited use of one colloquial dialect. GE credit: ArtHum | AH, WC. —W. (W.) Radwan

##### 123. Advanced Arabic (4)

Lecture/discussion—3 hours. Prerequisite: course 122 or permission of instructor. Continuation of course 122. Further development of advanced skills in reading, listening, writing, and speaking standard Arabic through work with texts, video, and audio on cultural and social issues. Limited use of one colloquial dialect. GE credit: ArtHum | AH, WC. —S. (S.) Radwan

##### 140. A Story for a Life: The Arabian Nights (4)

Lecture/discussion—3 hours; term paper. In-depth exploration of The Arabian Nights, the best-known work of pre-modern Arabic literature and a major work of world literature. Analysis of the work in its historical context and in comparison to other frame tales in world literature. (Same course as Comparative Literature 172 and Middle East/South Asia Studies 121C.) Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, WC, WE. —Radwan, Sharlet

##### 141. Readings in Modern Arabic Literature (4)

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 123 or consent of instructor. Readings of modern Arabic poetry and fiction in original format, assisted by instructor-prepared glossaries and other supplementary material. Readings to be followed by class discussion and short writing assignments in Arabic. Open to students at advanced proficiency in Arabic. May be repeated one time for credit if reading material changes. GE credit: ArtHum | AH, WC. —F. (F.) Radwan, Sharlet

##### 198. Directed Group Study (1-5)

Prerequisite: consent of instructor. Development of reading, writing, speaking, and listening skills in advanced Arabic. Materials may include al-Kitaab Part Two or Three, news articles and broadcasts, short stories, poetry, novels, essays, scripture, prophetic traditions, audio recordings, and television and film. May be repeated four times for credit if content differs. (P/NP grading only.) —F, W, S. (F, W, S.)

## Graduate

### 297. Directed Independent Study (4)

Discussion—1 hours; independent study. Prerequisite: graduate standing or consent of instructor. Restricted to graduate students. Directed Independent Study on a topic culminating in a term paper. Independent Study may only be arranged with consent of the instructor when graduate seminars are unavailable. Topic varies by instructor. May be repeated five times for credit when no graduate seminars are available and topic differs.—F, W, S. (F, W, S.) Radwan, Sharlet

### 299. Individual Study (1-12)

Prerequisite: graduate standing; consent of instructor. Restricted to graduate students. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## Professional

### 396. Teaching Assistant Training Practicum (1-4)

Prerequisite: graduate standing; consent of instructor. Restricted to graduate students. May be repeated 18 times for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## Courses in Classics (CLA)

### Lower Division

#### 1. The Ancient Near East and Early Greece: 3000-500 B.C.E. (4)

Lecture—3 hours; discussion—1 hour. Introduction to the literature, art, and social and political institutions of ancient Mesopotamia, Egypt, Palestine, and early Greece from 3000 to 500 B.C.E. GE credit: ArtHum, Wrt | AH, WC, WE.—Brelinski

#### 2. Ancient Greece and the Near East: 500 to 146 B.C.E. (4)

Lecture—3 hours; term paper. Introduction to the literature, art and thought and the political and social institutions and values of Greece and its eastern Mediterranean neighbors—the Persians, Egyptians, and Judeans. GE credit: ArtHum, Wrt | AH, WC, WE.—Brelinski

#### 3. Rome and the Mediterranean: 800 B.C.E. to 500 C.E. (4)

Lecture—3 hours; discussion—1 hour. Introduction to the history, literature, material culture, political and social institutions and values of Roman Civilization, with an emphasis on the development of the Roman Empire and the interactions of Roman culture with other Mediterranean cultures. GE credit: ArtHum | AH, WC, WE.—Stem

#### 4. Late Antiquity (4)

Lecture—3 hours; discussion—1 hour. History and culture of the Roman and Byzantine empires from the third to the eighth century. Transformation of the classical Mediterranean world through political and cultural interactions, rise of Christianity and Islam, beginning of the medieval period in Europe. GE credit: ArtHum | AH, WC, WE.—F, W. (F, W.) Albu, Chin

#### 10. Greek, Roman, and Near Eastern Mythology (3)

Lecture—3 hours. Examination of major myths of Greece, Rome, and the Ancient Near East; their place in the religion, literature and art of the societies that produced them; their subsequent development, influence and interpretation. GE credit: ArtHum | AH, VL, WC.—Rundin, Seal, Stem, Uhlig

#### 10Y. Greek, Roman, and Near Eastern Mythology—Hybrid (3)

Lecture—2 hours; web virtual lecture—1 hour. Prerequisite: course 3 (required concurrently) or consent of instructor. Examination of major myths of Greece, Rome, and the Ancient Near East; their place in the religion, literature and art of the societies that produced them; their subsequent development, influence and interpretation. GE credit: ArtHum | AH, VL, WC.—F, W, S. (F, W, S.) Brelinski, Rundin, Seal, Stem, Uhlig

#### 15. Women in Classical Antiquity (4)

Lecture/discussion—3 hours; term paper. Lives and roles of women and men in ancient Greece and Rome. Readings from history, philosophy, medical and legal documents, literature and myth. Offered irregularly. GE credit: ArtHum | AH, VL, WC, WE.—Popescu, Seal

#### 20. Pompeii AD 79 (4)

Lecture—3 hours; term paper. Roman life in an urban community at the time of the eruption of Vesuvius. Slide presentations of the archeological evidence will be supplemented by selected readings from Petronius' *Satyricon* and other ancient authors. GE credit: ArtHum, Wrt | AH, VL, WC, WE.

#### 25. The Classical Heritage in America (4)

Lecture/discussion—3 hours; term paper. Classical heritage in the New World, with emphasis on the United States from its colonial past to the present day. The reception of Greco-Roman thought and values as expressed in art, architecture, education, law, government, literature, and film. Offered irregularly. GE credit: ArtHum, Wrt | ACGH, AH, WE.

#### 30. Greek and Latin Elements in English Vocabulary (3)

Lecture—3 hours. Knowledge of Latin and Greek not required. Elements of Greek and Latin vocabulary for increased understanding of English word formation and improved ability to understand and retain unfamiliar words. Emphasis on Greek and Latin elements but other languages not neglected. Not open for credit to students who have completed course 30F. GE credit: ArtHum | AH.—F, W, S, Su. (F, W, S, Su.) Albu, Popescu, Rundin

#### 30F. Greek and Latin Elements in English Vocabulary (3)

Lecture—3 hours. Restricted to incoming freshmen. Knowledge of Latin and Greek not required. Elements of Greek and Latin vocabulary for increased understanding of English word formation and improved ability to understand and retain unfamiliar words. Emphasis on Greek and Latin elements but other languages not neglected. Not open for credit to students who have completed course 30. GE credit: ArtHum | AH.—F. (F.) Albu, Brelinski, Popescu, Rundin

#### 31. Greek and Latin Elements in Technical Vocabulary (3)

Lecture—3 hours. Knowledge of Greek and Latin not required. Elements of Greek and Latin vocabulary to increase understanding of English word formation in medical, scientific and technical terminology and improve ability to understand and retain unfamiliar terms. GE credit: ArtHum | AH.

#### 50. Ancient Science (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A or the equivalent. Study of science in ancient Greece and Rome; consideration of its social context; concentration on the basic concepts of physics, the world of medicine and biology, the history of mathematics, and the practices of astronomy, astrology and meteorology. (Same course as Science & Technology Studies 50.) Offered in alternate years. GE credit: ArtHum, Wrt | AH, WC, WE.—Webster

#### 51. Ancient Medicine (4)

Lecture—3 hours; discussion—1 hour. Medicine in ancient Greece and Rome; physiological conceptions of the body within scientific and social frameworks; exploration of sanitation technology and health in antiquity; medical treatment of the female body; medicine and the economy. (Same course as Science and Technology Studies 51.) Offered in alternate years. GE credit: AH, WC, WE.—Webster

#### 98. Directed Group Study (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

## Upper Division

#### 101A. Topics in Ancient Mediterranean Civilizations (4)

Lecture/discussion—3 hours; term paper. Prerequisite: a lower division Classics course or consent of instructor. Topics may be ordered by time or place

(e.g. Hellenistic Egypt) or by theme or genre (e.g. slavery in the ancient world). May be repeated two times for credit when topic differs. GE credit: ArtHum | AH, WC, WE.—F, W, S. (F, W, S.) Albu

#### 101B. Topics in Greek Civilization (4)

Lecture/discussion—3 hours; term paper. Prerequisite: a lower division Classics course or consent of instructor. Topics may be ordered by time or place (e.g. the world of Homer) or by theme or genre (e.g. the Greek art of war). May be repeated two times for credit when topic differs. GE credit: ArtHum | AH, WC, WE.—F, W, S. (F, W, S.) Albu, Webster

#### 101C. Topics in Roman Civilization (4)

Lecture/discussion—3 hours; term paper. Prerequisite: a lower division Classics course or consent of instructor. Topics may be ordered by time or place (e.g. Julius Caesar and his age) or by theme or genre (e.g. gladiators: blood in the arena). May be repeated two times for credit when topic differs. GE credit: ArtHum | AH, WC, WE.—F, W, S. (F, W, S.) Albu

#### 101D. Topics in Classical Receptions (4)

Lecture/discussion—3 hours; term paper. Prerequisite: a lower division Classics course or consent of instructor. Topics in classical reception from late antiquity to the present. Topics may be ordered by time or place (e.g. the classical tradition in Washington, D.C.) or by theme or genre (e.g. cinematic representations of the ancient world). May be repeated two times for credit when topic differs. GE credit: ArtHum | AH, WC, WE.—F, W, S. (F, W, S.) Albu

#### 101E. Topics in Ancient Science (4)

Lecture/discussion—3 hours; term paper. Prerequisite: course 50 or 51, or by consent of instructor. Topics may be ordered by discipline (e.g. ancient medicine), historical figure (e.g. Galen) or topic (e.g. science and the economy). May be repeated two times for credit when topic differs. Offered irregularly. GE credit: AH, WE.—Webster

#### 102. Film and the Classical World (4)

Lecture—3 hours; film viewing—2.5 hours. Prerequisite: a lower division Classics course or consent of instructor. The Classical World as portrayed in films. Viewings and discussions of modern versions of ancient dramas, modern dramas set in the Ancient Mediterranean world, and films imbued with classical themes and allusions. Supplementary readings in ancient literature and mythology. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.) Albu

#### 105. Theory and Practice of Greek and Roman Mythology (4)

Lecture/discussion—3 hours; term paper. Prerequisite: a lower division Classics course or consent of instructor. Thematically focused study of mythological narratives. Emphasis on the historical development of myths and the variety of theoretical approaches for the study of myth. GE credit: ArtHum | AH, WE.—F, W, S. (F, W, S.) Uhlig

#### 110. Origins of Rhetoric (4)

Lecture—3 hours; term paper. Prerequisite: a lower division Classics course or consent of instructor. Issues in the development of rhetoric from its origins in ancient Greece to A.D. 430. Special attention to works of Plato, Aristotle, Cicero, and Quintilian. Role of grammar and rhetoric in schools of Roman Empire. The Christian rhetoric of Saint Augustine. Not open for credit to students who have completed Rhetoric and Communication 110 or Communication 110. (Former course Rhetoric and Communication 110.) GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.)

#### 120. Greek and Roman Historiography (4)

Lecture/discussion—3 hours; term paper. Prerequisite: a lower division Classics course or consent of instructor. Survey of Greek and Roman historical writing in English translation. Authors to be read may include Herodotus, Thucydides, Sallust, Livy, and Tacitus. Focus on the development of historical writing as a literary genre. GE credit: ArtHum | AH, WC, WE.—F, W, S. (F, W, S.) Seal

**125. Roman Political Thought (4)**

Lecture—3 hours; term paper. Prerequisite: a lower division Classics course or consent of instructor. Survey of Roman thinking about politics, as expressed both in formal theorizing and in a variety of other contexts, including oratory, historiography, and epic. Study of Roman political reflection in its historical, cultural, and literary context. GE credit: ArtHum | AH, WC, WE.—F, W, S. (F, W, S.) Seal

**140. Homer and Ancient Epic (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: a lower division Classics course or consent of instructor. Reading of the classical epics of Homer (*Iliad*, *Odyssey*) and Virgil (*Aeneid*) in English. Discussion of techniques of composition, the beliefs and values of their respective societies, and the generic tradition of ancient epic. GE credit: ArtHum, Wrt | AH, WC, WE.—F, W, S. (F, W, S.) Brelinski, Popescu

**141. Greek and Roman Comedy (4)**

Lecture—3 hours; conference—1 hour. Prerequisite: a lower division Classics course or consent of instructor. Readings in Aristophanes, Menander, Plautus, and Terence; lectures on the development of ancient comedy. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.) Popescu

**142. Greek and Roman Novel (4)**

Lecture—3 hours; term paper. Prerequisite: a lower division Classics course or consent of instructor. Examination of the ancient Greek romances and their development into the grotesque realism of Petronius' *Satyricon*, and the religious mysticism of Apuleius' *The Golden Ass*. GE credit: ArtHum, Wrt | AH, WC, WE.—S. (S.) Popescu

**143. Greek Tragedy (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: a lower division Classics course or consent of instructor. Reading in English of selected plays of Aeschylus, Sophocles, and Euripides. Discussion of the development and influence of Athenian tragedy. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.) Popescu

**150. Socrates and Classical Athens (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: a lower division Classics course or consent of instructor. Study of the major sources of our knowledge of Socrates, assessment of his role in the politics and culture of ancient Athens, his method of teaching, and his place in Western thought. GE credit: ArtHum | AH, WC, WE.—F, W, S. (F, W, S.) Seal

**171. Mediterranean Bronze Age Archaeology (4)**

Lecture—3 hours; extensive writing. Prerequisite: a lower division Classics course or consent of instructor. Archaeological monuments of the ancient Near East, including Egypt and Mesopotamia, and of Greece and Crete during the Bronze Age. Special emphasis on the problems of state formation and on the co-existence and collapse of Bronze Age societies. GE credit: ArtHum, Div, Wrt | AH, WC.—F, W, S. (F, W, S.) Roller

**172A. Early Greek Art and Architecture (4)**

Lecture—3 hours; term paper. Examination of the origin and development of the major monuments of Greek art and architecture from the eighth century to the mid-fifth century B.C. (Same course as Art History 172A.) GE credit: ArtHum, Wrt | AH, VL, WE.—Roller

**172B. Later Greek Art and Architecture (4)**

Lecture—3 hours; term paper. Study of the art and architecture of later Classical and Hellenistic Greece, from the mid-fifth century to the first century B.C. (Same course as Art History 172B.) GE credit: ArtHum, Wrt | AH, VL.—Roller

**173. Roman Art and Architecture (4)**

Lecture—3 hours; term paper. Art and architecture of Rome and the Roman Empire, from the founding of Rome through the fourth century C.E. (Same course as Art History 173.) GE credit: ArtHum, Wrt | AH, VL, WE.—Roller

**174. Greek Religion and Society (4)**

Lecture—3 hours; term paper. Prerequisite: a lower division Classics course or consent of instructor. Cults, festivals, and rituals of Greek religious practice and their relationship to Greek social and political institutions, and to Greek private life. Includes discussion of major sanctuaries at Olympia, Delphi, Athens, and others. GE credit: ArtHum, Wrt | AH, WC.—F, W, S. (F, W, S.) Roller

**175. Architecture and Urbanism in Mediterranean Antiquity (4)**

Lecture—3 hours; extensive writing. Prerequisite: a lower division course (except 30, 31); Art History 1A recommended. Architecture and urban development in the ancient Near East, Greece, and Rome. Special emphasis on the social structure of the ancient city as expressed in its architecture, and on the interaction between local traditions and the impact of Greco-Roman urbanism. (Same course as Art History 175.) GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.—Roller

**190. Senior Seminar (4)**

Seminar—3 hours; term paper. Prerequisite: completion of one upper division course in Latin, Greek or Hebrew or consent of instructor. Advanced interdisciplinary study of a problem in the ancient Mediterranean world using the techniques of history, archaeology, art history and philology. May be repeated for credit with consent of instructor. GE credit: ArtHum, Wrt | AH, WE.

**190. Senior Seminar (4)**

Seminar—3 hours; term paper. Prerequisite: completion of one upper division course in Latin, Greek or Hebrew or consent of instructor. Advanced interdisciplinary study of a problem in the ancient Mediterranean world using the techniques of history, archaeology, art history and philology. May be repeated for credit with consent of instructor. GE credit: ArtHum, Wrt | AH, WE.

**194HA. Special Study for Honors Students (3)**

Discussion—1 hour; independent study; term paper. Prerequisite: admission to the honors program and consent of faculty member supervising honors thesis. Directed reading, research and writing culminating in the completion of a senior honors thesis under the direction of faculty adviser. (Deferred grading only, pending completion of sequence. P/NP grading only.) GE credit: AH.—F, W. (F, W.)

**194HB. Special Study for Honors Students (3)**

Discussion—1 hour; independent study; term paper. Prerequisite: admission to the honors program and consent of faculty member supervising honors thesis. Directed reading, research and writing culminating in the completion of a senior honors thesis under the direction of faculty adviser. (Deferred grading only, pending completion of sequence. P/NP grading only.) GE credit: AH.—F, S. (F, S.)

**197TC. Community Tutoring in Classical Languages (1-5)**

Tutoring—1-5 hours. Prerequisite: consent of instructor. Supervised instruction of Greek or Latin in nearby schools by qualified students in department. May be repeated for credit up to 5 units. (P/NP grading only.)

**198. Directed Group Study (1-5)**

Prerequisite: upper division standing. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

**Graduate****200A. Approaches to the Classical Past (4)**

Seminar—3 hours; term paper. Prerequisite: graduate student status or consent of instructor. Survey of major areas of classical scholarship, with special

emphasis on the continuing impact of Mediterranean antiquity on later literature, history, art, and culture.—F, W, S. (F, W, S.) Albu

**200B. Approaches to the Classical Past (4)**

Independent study—4 hours. Prerequisite: course 200A and graduate student status or consent of instructor. Restricted to graduate students. Research project on major area of Classical scholarship, with special emphasis on the continuing impact of Mediterranean antiquity on later literature, history, art, and culture.—F, W, S. (F, W, S.) Albu

**201. Introduction to Classical Philology (4)**

Seminar—3 hours; term paper. Survey of major contemporary areas of classical scholarship with special attention devoted to current problems in literary and textual criticism.

**202. Homer (4)**

Seminar—3 hours; term paper. Readings in the Iliad and Odyssey: the origins and transmission of the poems.

**203. Vergil (4)**

Seminar—3 hours; term paper. Reading of selected books of the Bucolics, Georgics, and Aeneid. Emphasis will be placed on the study of Vergilian poetic language.

**204. Greek and Roman Comedy (4)**

Seminar—3 hours; term paper. Historical and critical problems in Aristophanes or New Comedy. May be repeated for credit.

**205. Latin Lyric and Elegy (4)**

Seminar—3 hours; term paper. Critical examination of the works of Catullus, Horace, or Properius. May be repeated for credit.

**206. Greek Historiography (4)**

Seminar—3 hours; term paper. Development of historical writing in Greece. May be repeated for credit.

**207. Greek Drama (4)**

Seminar—3 hours; term paper. Literary and philosophical analysis of the plays of Euripides, Sophocles, or Aeschylus. May be repeated for credit.

**299. Research (1-12)**

Prerequisite: consent of instructor. (S/U grading only.)

**Professional****396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**Courses in Greek (GRK)****Lower Division****1. Elementary Greek (5)**

Lecture—5 hours. Introduction to the basic grammar and vocabulary of Classical and New Testament Greek. Development of translation skills with emphasis on Greek-English. (Students who have successfully completed Greek 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.) GE credit: ArtHum | AH.—F. (F.) Popescu

**2. Elementary Greek (5)**

Lecture—5 hours. Prerequisite: course 1 or the equivalent. Continuation of course 1. GE credit: ArtHum | AH.—W. (W.) Popescu

**2NT. Elementary New Testament Greek (1)**

Lecture—1 hour. Prerequisite: course 2 (required concurrently) or consent of instructor. Supplementary study of New Testament Greek. GE credit: ArtHum | AH.—W. (W.) Popescu

**3. Intermediate Greek (5)**

Lecture—5 hours. Prerequisite: course 2 or the equivalent. Continuation of course 2. Selected readings from Greek authors. GE credit: ArtHum | AH.—S. (S.) Popescu

**3NT. Elementary New Testament Greek (1)**

Lecture—1 hour. Prerequisite: course 3 (required concurrently) or consent of instructor. Supplementary study of New Testament Greek. GE credit: ArtHum | AH.—S. (S.) Popescu

**98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division****100. Readings in Greek Prose (4)**

Lecture/discussion—4 hours. Prerequisite: course 3 or equivalent. Review of Greek morphology, syntax, and vocabulary. Readings in Greek prose authors, including Xenophon. GE credit: ArtHum | AH.—F. (F.) Rundin, Seal

**101. Plato (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. GE credit: ArtHum, Wrt | AH, WE.—F. (F.)

**102. Euripides (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.) Popescu

**103A. Homer: Iliad (4)**

Recitation—3 hours; term paper. Prerequisite: course 3. GE credit: ArtHum, Wrt | AH, WE.—Brelinski

**103B. Homer: Odyssey (4)**

Recitation—3 hours; term paper. Prerequisite: course 100 or consent of instructor. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.)

**104. Menander (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.)

**105. Attic Orators (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Selected readings from the orators of 4th and 5th century Athens. May be repeated for credit if topic differs and with consent of instructor. GE credit: ArtHum | AH, WC, WE.—F, W, S. (F, W, S.) Seal

**110. Readings in the Greek Novel (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Selected readings from Greek prose fiction of the late classical, Hellenistic and imperial periods. May be repeated two times for credit with consent of instructor. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.)

**111. Sophocles (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.) Uhlig

**112. Aristophanes (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.)

**113. Thucydides (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. GE credit: ArtHum, Wrt | AH, WE.—Popescu, Seal

**114. Lyric Poetry (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Offered in alternate years. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.) Popescu

**115. Aeschylus (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Offered in alternate years. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.)

**116. Herodotus (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.)

**121. Greek Prose Composition (4)**

Lecture/discussion—4 hours. Prerequisite: course 100 or consent of instructor. Intensive grammar and vocabulary review through exercises in Greek prose composition. Offered in alternate years. GE credit: ArtHum | AH.—F, W, S. (F, W, S.)

**130. Readings in Later Greek (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Translation and discussion of selected readings from Hellenistic to Byzantine Greek literature. Offered in alternate years. GE credit: ArtHum | AH, WE.—F, W, S. (F, W, S.)

**198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Courses in Hebrew (HEB)****Lower Division****1. Elementary Hebrew (5)**

Lecture/discussion—4 hours; laboratory—1 hour. Speaking, listening, comprehension, reading and writing fundamentals of modern Hebrew. (Students who have successfully completed, with a C- or better, Hebrew 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.) GE credit: ArtHum | AH.—F. (F.) Franco

**1A. Accelerated Intensive Elementary Hebrew (15)**

Lecture/discussion—15 hours. Special 12 week accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Introduction to Hebrew grammar and development of language skills in a cultural context with emphasis on communication. Not open to students who have completed course 1, 2, or 3. GE credit: ArtHum | AH, WC.—Su. (Su.)

**2. Elementary Hebrew (5)**

Lecture/discussion—4 hours; laboratory—1 hour. Prerequisite: course 1 or the equivalent. Speaking, listening, comprehension, reading and writing fundamentals of modern Hebrew. GE credit: ArtHum | AH.—W. (W.) Franco

**3. Elementary Hebrew (5)**

Lecture/discussion—4 hours; laboratory—1 hour. Prerequisite: course 2 or the equivalent. Speaking, listening comprehension, reading and writing fundamentals of modern Hebrew. GE credit: ArtHum | AH.—S. (S.) Franco

**10. Introduction to Biblical Hebrew (3)**

Lecture/discussion—3 hours. Introduction to the Hebrew Alphabet and basic grammar rules of the biblical language. Students will learn to read most any biblical text and learn how to find the meaning of words by their roots and morphological structure. GE credit: ArtHum | AH, WC.

**21. Intermediate Mod Hebrew I (5)**

Lecture/discussion—5 hours. Prerequisite: course 3 or consent of instructor. Development and refinement of grammar, composition, and language skills required for reading literary texts and conversing about contemporary topics at an advanced level. History of the Hebrew language. Not open to students who have taken courses 100 or 100A.—Franco

**22. Intermediate Modern Hebrew II (5)**

Lecture/discussion—5 hours. Prerequisite: course 21 or consent of instructor. Continued development and refinement of grammar, composition, and language skills required for reading literary texts and conversing about contemporary topics at an advanced

level. History of the Hebrew language. Not open to students who have taken course 101 or 100B.—Franco

**23. Intermediate Modern Hebrew III (5)**

Lecture/discussion—5 hours. Prerequisite: course 22 or consent of instructor. Continued development and refinement of grammar, composition, and language skills required for reading literary texts and conversing about contemporary topics at an advanced level. History of the Hebrew language. Further development of writing and translating skills. Not open to students who have taken course 100C or 102.

**Upper Division****100AN. Advanced Modern Hebrew I (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 23 or consent of instructor. Students who have taken course 100A as 2nd year Hebrew may take course 100AN. Third year Hebrew. Advanced grammar and composition. Focus on reading of literary texts, oral skills and accuracy in writing. GE credit: ArtHum | AH.

**100BN. Advanced Modern Hebrew II (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100AN or consent of instructor. Students who have taken course 100B as 2nd year Hebrew may take course 100BN. Third year Hebrew. Advanced grammar and composition. Focus on reading of literary texts, oral skills and accuracy in writing. GE credit: ArtHum | AH.

**100CN. Advanced Modern Hebrew III (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100BN. Students who have taken course 100C as 2nd year Hebrew may take course 100CN. Third year Hebrew. Advanced grammar and composition. Focus on reading of literary texts, oral skills and accuracy in writing. GE credit: ArtHum | AH.

**Courses in Hindi (HIN)****Lower Division****1. Elementary Hindi/Urdu I (5)**

Lecture/discussion—5 hours. Introduction to Devanagari Script through development of all language skills in a cultural context with emphasis on communicative proficiency. GE credit: ArtHum | AH, WC.—F. (F.) Chauhan

**1A. Accelerated Intensive Elementary Hindi (15)**

Lecture/discussion—15 hours. Special 12-week accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Introduction to Devanagari Script through development of all language skills in cultural context with emphasis on communicative proficiency. Not open for credit to students who have completed course 1, 2 or 3. GE credit: ArtHum | AH.

**2. Elementary Hindi/Urdu II (5)**

Lecture/discussion—5 hours. Prerequisite: course 1. Continuation of course 1. Devanagari Script through development of all language skills in a cultural context with emphasis on communicative proficiency. GE credit: ArtHum | AH, WC.—W. (W.) Chauhan

**3. Elementary Hindi/Urdu III (5)**

Lecture/discussion—5 hours. Prerequisite: course 2. Introduction to Devanagari Script through development of all language skills in cultural context with emphasis on communicative proficiency. GE credit: ArtHum | AH, WC.—S. (S.) Chauhan

**21. Intermediate Hindi/Urdu (5)**

Lecture/discussion—5 hours. Prerequisite: course 3. An intermediate level course for students who have completed Elementary Hindi/Urdu or the equivalent. Students will continue to practice their skills in listening, speaking, reading and writing in Hindi and Urdu. GE credit: ArtHum | AH.—F. (F.) Chauhan

**22. Intermediate Hindi/Urdu II (5)**

Lecture/discussion—5 hours. Prerequisite: course 21. An intermediate level course where students will continue to practice their skills in listening, speaking, reading and writing in Hindi and Urdu. GE credit: ArtHum | AH.—W. (W.) Chauhan

**23. Intermediate Hindi/Urdu III (5)**

Lecture/discussion—5 hours. Prerequisite: course 22. An intermediate level course where students will continue to practice their skills in listening, speaking, reading and writing in Hindi and Urdu. GE credit: ArtHum | AH. —S. (S.) Chauhan

**Courses in Latin (LAT)****Lower Division****1. Elementary Latin (5)**

Lecture—5 hours. Introduction to basic grammar and vocabulary and development of translation skills with emphasis on Latin to English. (Students who have successfully completed Latin 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.) GE credit: ArtHum | AH. —F. (F.) Popescu, Rundin

**2. Elementary Latin (5)**

Lecture—5 hours. Prerequisite: course 1 or equivalent. Continuation of course 1. GE credit: ArtHum | AH. —W. (W.) Rundin

**3. Intermediate Latin (5)**

Lecture—5 hours. Prerequisite: course 2 or equivalent. Continuation of course 2. Selected readings from Latin authors. GE credit: ArtHum | AH. —S. (S.) Rundin

**98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division****100. Readings in Latin Prose (4)**

Lecture/discussion—4 hours. Prerequisite: course 3 or equivalent. Review of Latin morphology, grammar, and vocabulary. Readings in prose authors, including Julius Caesar. GE credit: AH. —F. (F.) Albu, Stem

**101. Livy (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. GE credit: ArtHum, Wrt | AH, WE. —F, W, S. (F, W, S.) Seal, Stem

**102. Roman Comedy (5)**

Lecture—4 hours; term paper. Prerequisite: course 100 or consent of instructor. GE credit: ArtHum, Wrt | AH, WE. —F, W, S. (F, W, S.) Albu

**103. Vergil: Aeneid (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. GE credit: ArtHum, Wrt | AH, WE. —Albu, Brelinski, Seal

**104. Sallust (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Offered in alternate years. GE credit: ArtHum, Wrt | AH, WE. —S. (S.) Stem

**105. Catullus (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. GE credit: ArtHum, Wrt | AH, WE. —F, W, S. (F, W, S.) Seal

**106. Horace: Odes and Epodes (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. GE credit: ArtHum, Wrt | AH, WE. —F, W, S. (F, W, S.) Albu, Seal

**108. Horace: Satires and Epistles (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. GE credit: ArtHum, Wrt | AH, WE. —F, W, S. (F, W, S.)

**109. Roman Elegy (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. GE credit: ArtHum, Wrt | AH, WE.

**110. Ovid (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or equivalent. Translation and discussion of selected readings from the works of Ovid.

May be repeated one time for credit when topic differs and with consent of instructor. GE credit: ArtHum, Wrt | AH, WC, WE. —Albu

**112. Cicero (4)**

Recitation—3 hours; term paper. Prerequisite: course 100 or equivalent. Translation and discussion of selected readings from the works of Cicero. May be repeated one time for credit if readings vary and with consent of instructor. GE credit: ArtHum, Wrt | AH, WE. —Stem

**115. Lucretius (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. GE credit: ArtHum, Wrt | AH, WE. —F, W, S. (F, W, S.) Webster

**116. Vergil: Eclogues and Georgics. (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. GE credit: ArtHum, Wrt | AH, WE. —F, W, S. (F, W, S.)

**118. Roman Historians (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or equivalent. Readings in Latin from one or more of the major Roman historians and biographers. Authors may include Sallust, Nepos, Livy, Tacitus, Suetonius, and Ammianus Marcellinus. GE credit: ArtHum | AH, WC, WE. —Seal

**119. Readings in Republican Latin Literature (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or equivalent. Translation and discussion of selected readings from Republican Latin literature. May be repeated for credit when topics vary. GE credit: ArtHum | AH, WC, WE. —Brelinski, Stem

**120. Readings in Imperial Latin Literature (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or equivalent. Readings in Imperial Latin literature. May be repeated two times for credit when topic differs. GE credit: ArtHum | AH, WC, WE. —Popescu, Seal, Stem

**121. Latin Prose Composition (4)**

Lecture/discussion—4 hours. Prerequisite: course 100 or equivalent. Intensive grammar and vocabulary review through exercises in Latin prose composition. GE credit: ArtHum | AH.

**125. Medieval Latin (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Selected readings from the Vulgate and various medieval authors provide an introduction to the developments in the Latin Language and literature from the fourth to the fifteenth centuries. GE credit: ArtHum, Wrt | AH, WE. —F, W, S. (F, W, S.) Albu

**130. Readings in Late Latin (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Translation and discussion of selected readings from late imperial-early medieval Christian and pagan literature. GE credit: ArtHum | AH, WC, WE. —F, W, S. (F, W, S.)

**198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) —F, W, S. (F, W, S.)

**199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) —F, W, S. (F, W, S.)

**Courses in Persian (PER)****Lower Division****1. Elementary Persian (5)**

Lecture/discussion—5 hours. Introduction to listening, speaking, reading and writing skills in Persian and to Persian culture. GE credit: ArtHum | AH, WC. —F. (F.) Sharlet

**Clinical Nutrition**

(College of Agricultural and Environmental Sciences)

**Faculty.** See the Department of Nutrition, on page 490.

**The Major Program**

The Clinical Nutrition major provides students with training in normal and therapeutic nutrition, biological and social sciences, food science, communication, business management and food service management. This major fulfills the academic requirements for admission into a dietetics internship or the equivalent, which must be completed before qualifying for registration as a dietitian.

**The Program.** The Clinical Nutrition major (formerly Dietetics) includes the same basic core of nutrition classes as the Nutrition Science major, but includes additional courses such as food service management, education, sociology, and communication skills to prepare for work with the public. Clinical Nutrition students spend the first two years completing preparatory course work in the basic biological sciences, along with several of the social sciences. In the final two years, students take courses in normal and clinical nutrition, food science, biochemistry, and management techniques.

Entering freshman or transfer students are assumed to have basic computer skills and to demonstrate mathematics competency adequate to pass the Math Placement Exam with a minimum score of 25.

**Career Alternatives.** The Clinical Nutrition major qualifies students to apply for a dietetic internship accredited by the Accreditation Council for Education in Nutrition and Dietetics enabling them to become a Registered Dietitian, the professional credential necessary to work in a clinical setting. Once dietitians are registered, they generally seek employment in administrative, therapeutic, teaching, research, or public health/public service positions in clinics, hospitals, schools, or other similar institutions. There is a growing role for dietitians working in settings outside of the traditional hospital (for example, in state and federal nutrition programs, nutrition education, Peace Corps and Cooperative Extension work). Students who complete the undergraduate preparation in clinical nutrition are also qualified to enter graduate programs in dietetics, nutrition science, public health nutrition, and food service management.

**B.S. Major Requirements:**

	UNITS
<b>Written/Oral Expression</b> .....	<b>8</b>
English 3 or University Writing	
Program 1 .....	4
Communication 1 .....	4
<b>Preparatory Subject Matter</b> .....	<b>47-48</b>
Biological Sciences 2A & 2B .....	10
Chemistry 2A, 2B, 2C, 8A, 8B .....	21
Economics 1A or 1B .....	4
Psychology 1 .....	4
Sociology 1 or 3 or Anthropology 2 .....	4-5
Statistics 13 .....	4
<b>Depth Subject Matter</b> .....	<b>82</b>
Agricultural and Resource Economics	
112 .....	4
Animal Biology 102 and 103 .....	10
Biological Sciences 101 .....	4
Food Science and Technology 100A, 100B, 101A, 101B .....	12
Food Service Management 120, 120L, 122 .....	9
Microbiology 102 and 103L .....	5
Nutrition 111AY, 111B, 112, 116A, 116AL, 116B, 116BL, 118, and 190 .....	26
Neurobiology, Physiology, and Behavior 101, 101L .....	8
Additional upper division Nutrition electives .....	4

**Total Units for the Major .....** 137**Major Adviser.** Francene Steinberg (*Nutrition*)**Advising Center** for the major is located in 3202 Meyer Hall 530-752-2512.**Graduate Study.** See *Graduate Studies*, on page 120.

## Clinical Nutrition and Metabolism

See *Internal Medicine (IMD)*, on page 437.

## Clinical Psychology

See *Medicine, School of*, on page 427.

## Clinical Research (A Graduate Group)

David M. Rocke, Ph.D., Chairperson of the Group

**Group Office.** CTSC, 2921 Stockton Blvd., Sacramento, CA 95817 916-703-9110

### Faculty

Timothy Albertson, M.D., Ph.D.  
(*Internal Medicine: Pulmonary and Critical Care Medicine*)

Aaron Bair, M.D. (*Emergency Medicine*)

Laurel Beckett, Ph.D. (*Public Health Sciences*)

Lars Berglund, M.D., Ph.D.  
(*Internal Medicine: Endocrinology, Clinical Nutrition, and Vascular Medicine*)

Catherine Cansino, M.D., M.P.H.  
(*Internal Medicine: Obstetrics and Gynecology*)

Cameron Carter, MMBS  
(*Psychiatry and Behavioral Sciences*)

Fernando Fierro, Ph.D.  
(*Cell Biology and Human Anatomy*)

James F. Holmes, Jr., M.D. (*Pediatrics*)

Roslyn Rivkah Isseroff, M.D. (*Dermatology*)

Nicholas J. Kenyon, M.D. (*Internal Medicine: Pulmonary and Critical Care Medicine*)

Kyoungmi Kim, Ph.D. (*Public Health Sciences*)

Richard Kravitz, M.D., MSPH (*Internal Med*)

Kit S. Lam, M.D., Ph.D. (*Biochemistry and Molecular Medicine, Internal Medicine: Hematology and Oncology*)

Nancy Lane, M.D.  
(*Internal Medicine: General Medicine*)

Primo Nery Lara, Jr., M.D.  
(*Internal Medicine: Hematology and Oncology*)

Joy Melnikow, M.D., M.P.H.  
(*Family and Community Medicine*)

Fred Meyers, M.D.  
(*Internal Medicine: Hematology and Oncology*)

John M. Olichney, M.D. (*Neurology*)

Sally Ozonoff, Ph.D.  
(*Psychiatry and Behavioral Sciences*)

David Pleasure, M.D. (*Neurology*)

Richard Pollard, M.D. (*Internal Medicine: Infectious and Immunologic Diseases*)

David M. Rocke, Ph.D. (*Public Health Sciences, Biomedical Engineering*)

Michael A. Rogawski, M.D., Ph.D. (*Neurology*)

Patrick Romano, M.D., M.P.H.  
(*Pediatrics, Internal Medicine*)

Saul Schaefer, M.D. (*Internal Medicine: Cardiovascular Medicine*)

Julie Schweitzer, Ph.D.  
(*Psychiatry and Behavioral Sciences*)

Tony J. Simon, Ph.D.  
(*Psychiatry and Behavioral Sciences*)

Dan Tancredi, Ph.D. (*Pediatrics*)

Alice F. Tarantal, Ph.D.  
(*Cell Biology and Human Anatomy*)  
Mark Yarborough, Ph.D. (*Internal Medicine*)

**Graduate Study.** Graduate Group in Clinical Research (GGCR) is an interdisciplinary graduate group in clinical research with a Master of Advanced Study degree in Clinical Research. The GGCR provides a solid clinical/translational, patient-oriented research foundation for junior faculty, clinical and pre-clinical fellows, and post-doctoral scholars. The program centers around three core elements: didactic instruction, mentored research, and special experiences:

Mandatory course work includes biostatistics, epidemiology, patient-oriented research, health services research, data management/informatics, scientific communication, research management, responsible conduct of research and career development. The instruction includes a 12-week summer curriculum followed by a one- or two-year core curriculum and electives that can be tailored to best meet each scholars career development needs.

**Degree Offered.** M.A.S. Plan II

**Degree Requirements** can be found at [http://www.ucdmc.ucdavis.edu/cpsc/area/education/ClinicalResearchGraduateGroup/crgg\\_degree\\_curriculum.html](http://www.ucdmc.ucdavis.edu/cpsc/area/education/ClinicalResearchGraduateGroup/crgg_degree_curriculum.html)

## Coaching Principles and Methods

(College of Letters and Science)

The Coaching Principles and Methods minor is an interdisciplinary minor open to undergraduates in all four colleges. Students must complete a statement of interest to assist in placing them in future internships. This form is available in the Physical Education Program Office, in 264 Hickey Gym, and may be turned in at any time.

### Minor Program Requirements:

#### Coaching Principles and Methods..... 20 UNITS

Physical Education 1; must complete a minimum of two Physical Education 1 courses in two different activities or sports.....	1
Physical Education 7 .....	1
Physical Education 100 .....	2
Physical Education 143 .....	3
Physical Education 141 .....	3
Physical Education 192 .....	2

#### Required Minor Electives

A minimum of eight units with courses from at least two different departments. One course must be taken from race/class/gender list. Second course can be from race/class/gender list or from sociocultural issues and settings list.

*Race/Class/Gender List:* One course from: African American Studies 123, 130, 133, American Studies 154, 156, Anthropology 128B, 139AN, Asian American Studies 112, 115, 116, 120, 150, 150B, 150C, 150D, 150E, Chicana/o Studies 110, 120, 122, 123, Native American Studies 115, 134, 180, Sociology 128, 129, 130, 132, 134, 172, 174, Women's Studies 130, 158, 170.

*Sociocultural Issues and Settings List:* American Studies 115, 130, 152, Anthropology 141B, Education 115, 122, 153, Exercise Biology 102, 121, 122, Human Development 100B, 110, Native American Studies 156, Physical Education 120, Psychology 126, 140, 151, 157, 158, 161, 162, 168, Sociology 122, 123, 124, 131, 153, Women's Studies 140

PHE 192 has a prerequisite of junior/senior standing. PHE 192 cannot be taken until after

a student has completed more than 90 total units. PHE 192 internship must be in a coaching or teaching setting. Setting must be approved IN ADVANCE by the coaching minor adviser before a CRN will be issued.

**Minor Adviser.** Lou Bronzan, 530-752-5541 or [stbronzan@ucdavis.edu](mailto:stbronzan@ucdavis.edu)

**Advising Center.** 289 Hickey Gym

## Cognitive Science

(College of Letters and Science)

Bernard Molyneux, Ph.D., Program Director

**Program Office.** 101 Young Hall;  
[cogsciadvising@ucdavis.edu](mailto:cogsciadvising@ucdavis.edu);  
<http://cogsci.ucdavis.edu/>

### Committee in Charge

Raul Aranovich, Ph.D. (*Linguistics*)

David Corina, Ph.D. (*Linguistics*)

Zoe Drayson, Ph.D. (*Philosophy*)

John Henderson, Ph.D. (*Psychology*)

Steven Luck, Ph.D. (*Psychology*)

Bernard Molyneux, Ph.D. (*Philosophy*)

### The Major Programs

The Cognitive Science major is designed to provide a broad interdisciplinary approach to the study of mind that includes courses from different departments and attracts students with a variety of interests. It emphasizes a multi-faceted approach to the study of mind that integrates concepts and techniques from psychology, artificial intelligence, linguistics, neurology, philosophy and other relevant fields.

For students interested in the liberal arts the Cognitive Science major can be pursued as a Bachelor of Arts (A.B.) program. Alternatively, it can be pursued as a Bachelor of Science (B.S.) program for students with a stronger interest in the mathematical, neurological and computational foundations of the discipline. The main objective of both programs is to give the student a broad grounding in the integrated sciences of the mind and to connect approaches from different fields. Students must complete a number of core courses for the degree, as well as a number of specialty courses on such wide-ranging topics as logic for artificial intelligence, computational linguistics, cognitive neuroscience, animal cognition and the psychology of music.

**Career Alternatives.** A degree in cognitive science provides broad intellectual foundations useful for careers in a variety of areas, including teaching, business, social work/counseling and the information technology industry. An undergraduate education in cognitive science also prepares the student for graduate study in appropriate subfields of psychology, linguistics, philosophy and informatics. It is also suitable training for pre-medicine, pre-law, and pre-management students.

### A.B. Major Requirements:

#### Preparatory Subject Matter ..... 28 UNITS

Linguistics 1 .....	4
Philosophy 10.....	4
Philosophy 13G.....	4
Psychology 1.....	4
Psychology 41 .....	4
Statistics 13.....	4
Philosophy 12.....	4

#### Depth Subject Matter..... 44

All courses from group A.....	12
Group A: Core	
One 4-unit upper division course in cognitive science, Psychology 101, Philosophy 112	
One course from group B .....	4
Group B: Computation Linguistics 177, Philosophy 133	

A further sixteen units from two of groups B-F..... 16

*Group C: Neuroscience*

Psychology 121, 135

*Group D: Linguistics*

Linguistics 103A, 103B, 131, 141, 171, 173

*Group E: Philosophy*

Philosophy 103, 104, 136

*Group F: Psychology*

Psychology 100, 137, 130, 131, 132,

136, 140, 141

Twelve additional units from groups B-G.. 12

*Group G: Other*

Communication 101, 105, 138, Education

110, 173, Human Development 100C,

102, 161, 163, Linguistics 112, 121, 150,

152, 182, Philosophy 102, 112, 125,

128, 137A, B or C, Psychology 113, 124/

NPB 124, 129, 148, 152, Statistics 106,

108, 141

**Total Units for the Major .....** 72

### B.S. Major Requirements:

Students select to pursue either the Computational Emphasis (Emphasis 1) or the Neuroscience Emphasis (Emphasis 2).

#### Computational Emphasis

UNITS

#### Preparatory Subject Matter..... 60

Engineering Computer Science 20, 30, 40,	40
50, 60,.....	20
Linguistics 1 .....	4
Mathematics 17AB or 21AB.....	8
Mathematics 22A+22AL .....	4
Philosophy 10.....	4
Philosophy 12.....	4
Philosophy 13G.....	4
Psychology 001 .....	4
Psychology 041 .....	4
Statistics 13 (or STA 102).....	4

#### Depth Subject Matter ..... 48

All courses from group A..... 12

*Group A: Core*

One four-unit upper division course in cognitive science, Engineering: Computer Science 140A, Philosophy 112

Three courses from group B .....

*Group B: Computation*

Eng. Computer Science 120, 170, 171, Linguistics 177, Philosophy 133

One course from group C .....

*Group C: Neuroscience*

Linguistics 175, Psychology 101, 135

One course from group D..... 4

*Group D: Philosophy/Linguistics*

Linguistics 103A, 103B, 150, 182, Philosophy 103, 104, 136

Four courses from group E in addition to any taken to satisfy group C requirements .....

16 *Group E: Psychology*

Psychology 100, 101, 103A, 103B, 113, 121, 124, 137, 129, 130, 131, 135

**Total Units for the Major .....** 108

#### Neuroscience Emphasis

UNITS

#### Preparatory Subject Matter ..... 62-65

Biological Science 2ABC .....	14
Linguistics 1 .....	4
Mathematics 17ABC or 21ABC .....	12
Philosophy 10.....	4
Philosophy 13G.....	4
Physics 7ABC (or 9ABC) .....	12-15
Psychology 001 .....	4
Psychology 041 .....	4
Statistics 13 (or STA 102).....	4

#### Depth Subject Matter ..... 45-47

All courses from group A..... 13

*Group A: Core*

One four-unit upper division course in cognitive science, Neurobiology,

Physiology, and Behavior 100, Psychology 103A

One course from group B .....

*Group B: Computation*

Linguistics 177, Neurobiology, Physiology, and Behavior 167

12-13 units from group C..... 12-13

*Group C: Neuroscience*

Neurobiology, Physiology, and Behavior

112, 152, 161, 162, 163, 164, 165,

Linguistics 175, Psychology 101, 121, 135

Two courses from group D..... 8

*Group D: Philosophy/Linguistics*

Linguistics 103A, 103B, 150, 182,

Philosophy 103, 104

Two courses from group E in addition to any taken to satisfy group C requirements .....

8 *Group E: Psychology*

Psychology 100, 101, 113, 121, 122/

NPB 122, 124/NPB 124, 137, 129, 130,

131, 132, 135

**Total Units for the Major .....** 107-112

#### Major Advisers.

101 Young Hall;

cogsciadvising@ucdavis.edu

## Communication

(College of Letters and Science)

Robert A. Bell, Chairperson of the Department

**Department Office.** 469 Kerr Hall;

530-752-0966

### Faculty

George A. Barnett, Ph.D., Professor

Robert A. Bell, Ph.D., Professor

Jaeho Cho, Ph.D., Associate Professor

Drew Cingel, Ph.D., Assistant Professor

Bo Feng, Ph.D., Assistant Professor

Martin Hilbert, Ph.D., Assistant Professor

Nicholas A. Palomares, Ph.D., Associate Professor

Jorge Peña, Ph.D., Assistant Professor

Cuihua (Cindy) Shen, Ph.D., Assistant Professor

Laramie D. Taylor, Ph.D., Associate Professor

Narine Yegian, Ph.D., Assistant Professor

Jingwen Zhang, Ph.D., Assistant Professor

### Emeriti Faculty

Rina Alcalay, Ph.D., Professor Emerita

Charles R. Berger, Ph.D., Professor Emeritus

Michael T. Motley, Ph.D., Professor Emeritus

James J. Murphy, Ph.D., Professor Emeritus

*Academic Senate Distinguished Teaching Award*

Ralph S. Pomeroy, Ph.D., Professor Emeritus

John L. Vohs, M.A., Senior Lecturer Emeritus

### Affiliated Faculty

Virginia O. Hamilton, Ph.D., Lecturer

Alisa Shubb, M.A., Lecturer

John Theobald, M.A., Lecturer

### The Major Program

The major in communication focuses upon human symbolic behavior in interpersonal and mediated contexts.

**The Program.** The program of study in communication examines communication processes at several different levels of analysis. Courses dealing with communication at the individual, interpersonal, organizational and societal levels of analysis are offered.

The emphasis in the program reflects the changing focus in the discipline and society toward computer-mediated communication, quantitative behavioral science and cognitive science. Classes addressing such topics as communication and cognition, message systems, interpersonal communication, nonverbal communication, communication and persuasion, organizational communication, mass media effects, computer-mediated communication and public communication campaigns explore communication at these levels of analysis. Related social science courses are also part of the major.

**Career Alternatives.** Communication graduates have found careers in such fields as broadcast and print journalism, administration, sales, management, politics and government, education, social work, and public relations. A communication degree is also excellent preparation for law school or other graduate programs.

### A.B. Major Requirements:

UNITS

#### Preparatory Subject Matter .....

29-30

Anthropology 4 or Linguistics 1 .....

4

Communication 10Y.....

4

Communication 1 or 3 or 5/Linguistics 5 .....

4

Computer Science 15 or Philosophy 12 .....

4

Psychology 1 .....

4

Sociology 1 .....

5

Statistics 13 or Sociology 46B .....

4-5

#### Depth Subject Matter .....

40

Communication 101; 102; 120; 140; 170/

170V or 172.....

Select five of the following additional courses: .....

20

Communication 110, 111, 112, 114, 121,

122, 123, 130, 131, 136, 139, 141,

142, 143, 144, 145, 146, 148, 161, 165,

170, 172, 174, 176, 180, 189A, 189B,

189C, 189D, Anthropology 117, 120,

Economics 122, Linguistics, 171, 177,

182, Political Science 165, Psychology

100, 107, 152, 154, Sociology 126, 175,

Statistics 102, 106, 108

Note: Many of the upper division courses offered by the other L&S departments have their own prerequisites not accounted for by lower division Communication courses. To the degree that students elect to take those courses having "hidden prerequisites," the number of units necessary to complete the major increases above the stated minimum.

#### Total Units for the Major .....

69-70

**Grading recommendation.** Although not required, it is recommended that all courses offered in satisfaction of the major, except variable-unit courses, be taken for a letter grade.

**Major Advisers.** Faculty; contact department.

**Advising Office.** 466 Kerr Hall

### Minor Program Requirements:

UNITS

#### Communication .....

24

One course from: Communication 1, 3 .....

4

At least five upper division courses in communication .....

20

**Graduate Study.** The Department of Communication offers programs of study and research leading to M.A. and Ph.D. degrees in Communication. Detailed information may be obtained from the Graduate Adviser, Department of Communication.

**Graduate Adviser.** B. Feng

### Courses in Communication (CMN)

Students must have satisfied the Entry Level Writing requirement before taking any course in Communication.

### Lower Division

#### 1. Introduction to Public Speaking (4)

Lecture—2 hours; discussion—2 hours. Practice in the preparation and delivery of speeches based on contemporary principles and strategies of informing and persuading audiences. GE credit: Wrt | OL, WE—F, W, S. (F, W, S.) Shubb

#### 3. Interpersonal Communication Competence (4)

Lecture—2 hours; discussion—2 hours. Communication in interpersonal contexts. Sender, receiver, and message variables, and their interaction with communication competence. Participation in simulations and experiential exercises. GE credit: SocSci | SS.—F, W, S. (F, W, S.) Hamilton

**5. Global English and Communication (4)**

Lecture—2 hours; discussion—2 hours. English as a global language and its uses in intercultural communication. Cultural, historical, and political dimensions of varieties of English spoken around the world. Experiential grounding in strategies for increasing interpretive and verbal communicative competence for a globalized world. (Same course as Linguistics 5.) GE credit: ArtHum or SocSci | AH or SS, OL. WC.—W. (W.) Farrell, Feng, Ramamthan

**10Y. Introduction to Communication (4)**

Web virtual lecture—3 hours; discussion—1 hour. Basic principles of communication and communication processes; models of communication; foundations of empirical research in communication; contexts of communication and communication research including interpersonal, intercultural, news, entertainment, mediated, and others. GE credit: SocSci | SS.—F, W, S, Su. (F, W, S, Su.) Taylor

**12Y. Data Visualization in the Social Sciences (4)**

Lecture—2 hours; laboratory—1.5 hours; web virtual lecture—1.5 hours. Introduction to quantitative data across the social sciences (Communications, Political Science, Psychology, Sociology, and other disciplines). Transforming data, describing data, producing graphs, visual reasoning, and interpretations. (Same course as Sociology 12Y, Political Science 12Y, Psychology 12Y.) GE credit: QL, VL.—F, W, S. (F, W, S.) Cross

**76. Video Games and Virtual Environments (4)**

Lecture—3 hours; discussion—1 hour. Impact of video games on players and society. Topics include motivations for playing games; cognitive, emotional, and behavioral effects, including violence and addiction; interpersonal and group processes in online games; virtual communities; and video games for education. GE credit: SocSci | SS, VL.—F. (F.) Peña

**99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division****101. Communication Theories (4)**

Lecture—3 hours; discussion—1 hour. Forms, functions, development, and testing of communication theory, with emphasis on social scientific approaches. Survey and comparison of significant micro and macro theories and models of face-to-face and mediated communication. Application of theories to real world problems. GE credit: SocSci | SS.—F, W, S, Su. (F, W, S, Su.) Feng

**102. Empirical Methods in Communication (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 13 or equivalent. Social scientific research methods commonly employed in Communication. Topics include research design, measurement, sampling, questionnaire construction, survey research, experimental design, evaluation research, content analysis and qualitative field methods. GE credit: SocSci | QL, SS.—F, W, S. (F, W, S.) Bell, Palomares, Yegian

**110. Communication Networks (4)**

Lecture/discussion—4 hours. Theoretical approaches to communication networks, practical applications of network studies, and network analysis tools. Topics include friendship, political discussion, social support, organizational, social media, and disease transmission networks. Impact of emerging technologies on network creation, maintenance, and expansion. GE credit: SocSci | SS.—F. (F.) Barnett, Shen

**111. Gender Differences in Communication (4)**

Lecture—4 hours. Pass One open to Communication majors only. Examination of communication differences between men and women as sources of male/female stereotypes, misunderstandings, dilemmas, and difficulties (real and imagined). Treatment of

genders as cultures. Topics include male/female differences in discursive practices and patterns, language attitudes, and relationship dynamics. Not open for credit to students who have taken Communication 103. GE credit: SocSci | DD, SS.—F, W. (F, W.) Palomares

**112. Theories of Persuasion (4)**

Lecture/discussion—4 hours. Pass One open to Communication majors only. Theories and models of persuasion that account for the effects of source, channel and audience factors on message recipients. Examination of message strategies for altering attitudes and gaining compliance. Contexts of application include interpersonal relationships, advertising, politics, and health. Not open for credit to students who have taken Communication 152. GE credit: SocSci | SS.—F, W. (F, W.) Bell, Puckering

**114. Communication and Cognition (4)**

Lecture—4 hours. Pass One open to Communication majors only. Relationship between communication and cognition in interpersonal and mediated contexts. Models of discourse comprehension and production, the influence of language attitudes on social judgments, and the effects of information processing on decision making are explored. Not open to students who have completed course 138. GE credit: SocSci | SS.—S. (S.) Yegian

**120. Interpersonal Communication (4)**

Lecture—4 hours. Pass One open to Communication majors only. Theories and principles of interpersonal communication related to perception, verbal and nonverbal channels, mutual understanding, and relationship development. Communication processes in face-to-face and technologically-mediated encounters. Consideration of different relationship contexts, including friendships, dating and family relationships, and the workplace. Not open for credit to students who have completed course 134. GE credit: SocSci | SS.—F, W, S. (F, W, S.) Feng, Puckering

**121. Language Use in Conversation (4)**

Lecture/discussion—4 hours. Pass One open to Communication majors only. Examination of how people use language in social interaction, how they exchange meaning during conversation, and how their use of language plays a central role in turn-taking, speech acts, attitude formation, figurative speech, politeness, and other aspects of conversation. Not open for credit to students who have taken course 105. GE credit: SocSci | SS.—F, W. (F, W.) Palomares

**122. Nonverbal Communication (4)**

Lecture—4 hours. Pass One open to Communication majors only. Examination of the interaction between nonverbal communication and verbal communication channels in influencing outcomes in interpersonal relationships. Underlying functions served by nonverbal communication are considered. Not open for credit to students who have completed course 135. GE credit: SocSci | SS.—F, S. (F, S.) Puckering

**123. Intercultural Communication (4)**

Seminar—3 hours; term paper. Pass One open to Communication majors only. Major concepts and theories of intercultural communication. Topics include cultural similarities and differences in verbal and nonverbal communication; dimensions of cultural variations, barriers to intercultural communication, and intercultural communication competence. Not open for credit to students who have taken course 137. GE credit: SocSci | SS.—S. (S.) Feng

**130. Group Communication (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 13 or equivalent. Communication processes in the development and maintenance of effective groups and teams in organizations. Examination of both face-to-face and computer-mediated group interaction. Topics include group development, power, norms, cohesion, decision making, problem solving, creativity, conflict management, working remotely, and leadership. GE credit: SocSci | SS.—F. (F.)

**131. Strategic Communication in Public Relations (4)**

Lecture/discussion—4 hours. Pass One open to Communication majors only. Principles, evolution, and professional practice of public relations. Planning and execution of effective, ethical communication strategies and campaigns. Distribution of messages through traditional and new media, including social media. Cultivation of relationships between organizations and their publics. Crisis communication management. GE credit: SocSci | SS.—F. (F.) Barnett

**136. Organizational Communication (4)**

Lecture—4 hours. Pass One open to Communication majors only. Organizational communication theory and practice is examined with an emphasis on the use of effective communication strategies for achieving organizational goals. GE credit: SS.—F, W, Su. (F, W, Su.) Barnett, Hamilton

**139. Advanced Organizational Communication (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 136. Pass One open to Communication majors only. Communication processes within and among social organizations. Examines formal organizations as information processing systems. Topics include general systems theory, input-output analysis, structural-functionalism, cybernetics, organizational network analysis, organization environments, organizations as cultures, organizational learning, information technologies, and communication diagnostic/auditing strategies. GE credit: SocSci | SS, WE.—S. (S.) Barnett

**140. Introduction to Mass Communication (4)**

Lecture/discussion—4 hours. History of mass media and media research traditions. Organization and economics of the media industry. Media policy, law, regulation and ethics. Impact of the media on individuals and society. Traditional, new and emerging communication technologies. GE credit: SocSci | SS.—F, W, S, Su. (F, W, S, Su.) Cho, Taylor, Yegian

**141. Media Effects: Theory and Research (4)**

Lecture/discussion—4 hours. Prerequisite: course 140. Pass One open to Communication majors only. Social scientific studies of the effects of mass media messages on audience members' actions, attitudes, beliefs, and emotions. Topics include the cognitive processing of media messages, television violence, political socialization, cultivation of beliefs, agenda-setting, and the impact of new technologies. GE credit: SocSci | SS.—W, S. (W, S.) Cho, Taylor

**142. News Policies, Practices and Effects (4)**

Lecture—4 hours. Prerequisite: course 102 (or equivalent course in research methods), course 140. Pass One open to Communication majors only. Exploration of processes and constraints in the gathering, editing, and reporting of news. Examination of studies on the effects of news, contemporary challenges to news reporting presented by new technologies, and the relationship of news to other social institutions. GE credit: SocSci | ACGH, SS.—F, W, S. (F, W, S.) Theobald

**143. Analysis of Media Messages (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 102 (or equivalent course in research methods), course 140. Pass One open to Communication majors only. Examination of alternative approaches to the analysis, interpretation, and evaluation of media messages, including those disseminated through broadcasting, print, and new technologies. GE credit: SocSci, Wrt | ACGH, SS, Wrt.—F, W, S. (F, W, S.) Cho

**144. Media Entertainment (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 102 (or equivalent course in research methods), course 140. Pass One open to Communication majors only. Effects and appeal of media entertainment, emphasizing emotional reactions. Topics include key concepts of entertainment research such as mood management, and the

respective features and emotional/social-psychological effects of genres such as comedy, mystery, thriller, sports, music, horror, and erotica. GE credit: SocSci | SS, WE.—S. (S.) Taylor

#### **145. Political Communication (4)**

Lecture/discussion—4 hours. Prerequisite: course 102 or equivalent course in research methods and course 140. Pass One open to Communication majors only. Discussion of theories and research on the relationships among the mass media, citizens, and politics, production of political news, campaign strategies, and citizens' attitudes and behaviors. Provides frameworks for mediated politics, the news, and elite discourse and campaign messages. Offered irregularly. GE credit: SocSci | ACGH, SS.—Cho

#### **146. Communication Campaigns (4)**

Lecture/discussion—4 hours; term paper. Pass One open to Communication majors only. Strategic uses of media and interpersonal communication channels in health, environmental advocacy, and political campaigns. Emphasis on general principles relevant to most campaign types, including public information, social marketing, and media advocacy campaigns. GE credit: SocSci | SS.—S. (S.) Barnett, Theobald

#### **148. Contemporary Trends In Media (4)**

Lecture/discussion—4 hours. Pass One open to Communication Major only. Global trends in media, including media and globalization, impacts of the new media economy, media and security, and effects of ownership on media content and culture. Offered irregularly. GE credit: SocSci | SS.—Barnett, Theobald

#### **161. Health Communication (4)**

Lecture/discussion—4 hours. Health communication theories and research, including a review of research on health literacy, social support and coping, doctor-patient interaction, health communication campaigns, and media influences on health. Application of new communication technologies in health promotion. GE credit: SocSci | SS.—S. (S.) Bell

#### **165. Media and Health (4)**

Lecture/discussion—4 hours. Prerequisite: course 102 or equivalent course in research methods. Content and effects of health messages in news, entertainment, and advertising. Topics include health news reporting; portrayals of disease, disability, death and health-related behaviors; representations of health professionals; promotion of drugs and other health products; tobacco and alcohol advertising. GE credit: SocSci | SS.—S. (S.) Bell, Taylor

#### **170. Digital Technology and Social Change (4)**

Lecture/discussion—4 hours. Conceptual understanding of how digital communication technologies transform our lives through social media, mobile connectivity, globalization, and big data. Contexts of application include education, health, entrepreneurship, democracy, and poverty. GE credit: SocSci | SS.—S. (S.) Hilbert, Theobald

#### **170V. Digital Technology and Social Change (4)**

Web virtual lecture—3 hours; web electronic discussion—1 hour. Conceptual understanding of how digital technologies transform our lives, through social media, mobile connectivity, globalization, big data, and artificial intelligence. Context of course include education, health, entrepreneurship, democracy, among others. Not open for credit to students who have completed course 170. GE credit: SocSci | SS.—F, W, S, Su. (F, W, S, Su.) Hilbert

#### **172. Computer-Mediated Communication (4)**

Lecture/discussion—4 hours. Pass One open to Communication majors only. Theories and research pertaining to how people use technologies for interpersonal purposes. Impression formation, self-presentation, long-distance romantic relationships, online dating, deception, anonymity, maintaining friendships, and transmitting emotions in online contexts. GE credit: SocSci | SS.—S. (S.) Peña

#### **174. Social Media (4)**

Lecture—4 hours. Application of theories of communication to the study and design of social media. Examination of social media in various contexts such as health, political movements, and collaboration. Topics include motivations for membership, participation, virality, social-technical capital, and privacy. GE credit: SocSci | SS.—F, S. (F, S.) Shen

#### **176. Video Games Theory and Research (4)**

Lecture/discussion—2 hours; laboratory/discussion—2 hours. Prerequisite: course 102 or an equivalent research methods course. Communication theory and research on the uses and effects of video games. Research methods available for investigating game use and the impact of games on behavior. Application of those methods in a research project. GE credit: SS.—W. (W.) Peña

#### **180. Current Topics in Communication (4)**

Lecture/discussion—4 hours. Prerequisite: course 101 and 102 (or equivalent research methods course). Pass One open to Communication majors only. Group study of a special topic in communication. May be repeated one time for credit when topic differs. Offered irregularly. GE credit: SocSci | SS.—S. (S.)

#### **189A. Proseminar in Social Interaction (4)**

Seminar—3 hours; term paper. Prerequisite: course 101, 102, 136; consent of instructor. Open to Communication majors only. Reading, discussion, research, and writing on a selected topic in the specialty of social interaction. Potential topics include relationship initiation, maintenance, and deterioration; communication failure; nonverbal communication; conversational management; semantics and pragmatics of languages; and family/marital communication. May be repeated for credit when topic differs. Offered in alternate years. GE credit: SocSci, Wrt | SS, WE.—S. Feng, Palomares

#### **189B. Proseminar in Mass Communication (4)**

Seminar—3 hours; term paper. Prerequisite: course 101, 102, 140; consent of instructor. Reading, discussion, research, and writing on a selected topic in the specialty of mass communication. Potential topics include, agenda-setting, the cultivation of beliefs, television violence, media portrayals of underprivileged groups, mediated political discourse, interactive technologies, and international/global communications. May be repeated for credit when topic differs. Offered in alternate years. GE credit: SocSci, Wrt | SS, WE.—S. Berger, Cho, Hwang, Taylor, Yegian

#### **189C. Proseminar in Health Communication (4)**

Seminar—3 hours; term paper. Prerequisite: course 101; 102; 161 or 165; consent of instructor. Open to Communication majors only. Reading, discussion, research, and writing on a selected topic in health communication. Potential topics include health communication design and evaluation, media advocacy, physician-patient interaction, uses of communication technologies in health settings, and health-related advertising. May be repeated for credit when topic differs. Offered in alternate years. GE credit: SocSci, Wrt | SS, WE.—S. Bell, Feng, Taylor

#### **189D. Proseminar in Organizational Communication (4)**

Seminar—3 hours; term paper. Prerequisite: course 101, 102, 136; consent of instructor. Open to Communication majors only. Reading, discussion, research, and writing on a selected topic in the specialty of organizational communication. Potential topics include organizational networks, organizational conflict and its resolution, mediation, bargaining and negotiation, superior-subordinate interaction, leadership styles, and inter-organizational communication. May be repeated for credit when topic differs. Offered in alternate years. GE credit: SocSci, Wrt | SS, WE.—S. Barnett

#### **192. Internship in Communication (1-12)**

Internship—3-36 hours. Prerequisite: communication majors who have completed 20 units of upper division communication courses; consent of instruc-

tor. Open to Communication majors only. Supervised work experience requiring the application of communication principles and strategies or the evaluation of communication practices in a professional setting. Relevant experiences include public relations, advertising, sales, human resources, health promotion, political campaigns, journalism, and broadcasting. May be repeated up to 6 units of credit. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **194H. Senior Honors Thesis (4)**

Seminar—1 hour; individual tutoring on research project—3 hours. Prerequisite: senior standing and approval by Honors Committee. Directed reading, research, and writing culminating in the preparation of honors thesis under direction of faculty adviser. GE credit: SocSci | SS, WE.

#### **197T. Tutoring in Communication (2-4)**

Seminar—1-2 hours; laboratory—1-2 hours. Prerequisite: upper division standing with major in Communication and consent of Department Chairperson. Tutoring in undergraduate Communication courses, including leadership of discussion groups affiliated with departmental courses. May be repeated for credit up to a total of six units. (P/NP grading only.)

#### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

#### **199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.)

#### **Graduate**

#### **201. Theoretical Perspectives on Strategic Communication (4)**

Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Explores the intentional use of discourse and nonverbal behavior to reach goals. Explores theories and models that elucidate the processes that enable the realization of intentions in message plans and discourse.—F. (F.)

#### **202. Communication Theory Construction (4)**

Seminar—4 hours. Prerequisite: consent of instructor; graduate standing. Alternative meta-theoretical perspectives for theory generation in communication inquiry. Processes of construct explication, operationalization and theory construction. Emphasis on the critique of extant communication theories and the development of theory construction skills. Offered irregularly.—S. Barnett

#### **203. Scientific Methods for Communication (4)**

Seminar—3 hours; term paper. Prerequisite: 201, 202, Psychology 204A, 204B or equivalent. Social scientific research methods commonly employed in Communication. Topics include research design measurement sampling questionnaire construction survey research experimental design evaluation research content analysis and qualitative field methods.—S. (S.) Palomares, Yegian

#### **210. Experimental Methods and Analysis in Communication (4)**

Lecture—4 hours. Prerequisite: graduate standing; one course in inferential statistics; consent of instructor. Experimental designs in communication. Topics include: causation; threats to validity; conceptualization, operationalization, and measurement; hypothesis testing; ethics; data analysis software focusing on the analysis of variance and planned contrasts; and the practical and effective implementation and writing of experiments.—F. (F.) Palomares

#### **211. Survey Research Methods in Communication (4)**

Seminar—4 hours. Prerequisite: graduate standing; one course in inferential statistics; consent of instructor. Methods for designing personal interview, phone, mail, and web-based surveys in communication. Topics include: sampling strategies, sources of error and bias in survey designs, questionnaire construction, cognitive interviewing, interviewer behavior, and analysis of complex survey data using standard software packages.—W. (W.) Bell, Cho

**220. Persuasion Theories and Message Design (4)**

Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Major social scientific theories and perspectives on attitude change and persuasion. Application of persuasion theories and principles to persuasive message design in applied contexts.—S. (S.)

**221. Communication and Cognition (4)**

Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Explores the cognitive structures and processes that enable the production, comprehension and interpretation of messages in face-to-face and mediated communication contexts. Explores the communication outcomes associated with these processes. Offered in alternate years.—(W.) Yegian

**222. Risk Communication (4)**

Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Theories and models of individual risk information processing. Media depictions of threats and risk-related information and their potential effects on audiences. Implications for the design and implementation of messages concerning threat and risk. Offered irregularly.—S. (S.)

**230. Social Interaction Theory and Research (4)**

Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Survey of theories and research on social interaction and interpersonal communication. Covers communication codes, individual differences in communication, communication and relationship development, family communication, conflict, cognitive and emotional processes underlying social interaction, social influence, intercultural communication, and nonverbal behavior.—W. (W.) Feng, Palomares

**231. Tactics of Interpersonal Influence (4)**

Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Achievement of interpersonal goals in social interaction. Topics include message production; tactics, strategies and planning; anticipating potential obstacles; resisting and thwarting goals; plan recognition; and goal detection. Examined goals include compliance gaining, attitude change, ingratiation, information seeking, comforting, and deception. Offered in alternate years.—(S.)

**232. Health Communication (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Health communication theories and research traditions. Topics include consumer health information seeking; physician-patient interaction; information, social marketing, "edutainment," and media advocacy campaigns; social networks and coping; media influences on health; and new communication technologies in health promotion and healthcare delivery. (Same course as Public Health Science 232.) Offered in alternate years.—(W.) Bell

**233. Communication in Medicine (4)**

Seminar—3 hours; term paper. Restricted to graduate standing. Survey of research on communication between patients and health care providers. Topics include verbal and nonverbal behavior, power and influence, empathy and support, and conflict management. Cultural, social, organizational, and technological influences on communication are examined. Offered in alternate years.—W. Bell

**234. Intercultural Communication (4)**

Seminar—3 hours; term paper. Restricted to graduate standing. Theories and research on intercultural communication. Topics include national, racial, and ethnic similarities and differences in communication practices; cultural beliefs and values; identity and conflict; and technological influences on intercultural communication. Methodological issues in intercultural communication research are also examined. Offered in alternate years.—(S.) Peña

**243. Media and Health (4)**

Seminar—3 hours; term paper. Restricted to graduate standing. Survey of research on media and health. Topics include health news coverage; depictions of health, illness and disability in entertainment;

health campaigns; advertising of health products and services; and the influence of gaming and other new media on health behaviors. Offered irregularly.—W. (W.) Bell, Taylor

**244. Organizational Communication (4)**

Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Theory and research on communication processes in organizations.—Barnett

**250. Mediated Communication Theory and Research (4)**

Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Survey of major theories on the intended and unintended effects of mediated communication. Topics include media's effects on learning, political behavior, interpersonal violence, sexual socialization, consumer behavior, race relations, gender socialization, and cultural processes.—W. (W.) Cho, Taylor, Yegian

**251. Digital Technology and Social Change (4)**

Seminar—3 hours; term paper. Conceptual, theoretical, and international consideration of how digital communication technologies transform social organization and development. Topics include social media, big data, political revolutions, e-democracy, digital divide, e-education, e-health, entrepreneurship, public policies, poverty reduction, technological innovations, microfinance, and entertainment. Offered in alternate years.—(W.) Hilbert

**252. Computer-Mediated Communication (4)**

Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. The effects of computer-mediated communication on the ways in which people express themselves, form impressions about strangers, develop and maintain relationships, collaborate on group work, and expand social network, especially in comparison to face-to-face communication. Offered in alternate years.—(S.) Peña

**254. Communication Campaigns (4)**

Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Strategic uses of media and interpersonal channels to promote social change through social marketing, information, and media advocacy campaigns. Focus on theory-based interventions in a variety of applied contexts. Offered in alternate years.—(W.) Barnett, Bell

**255. Social Media (4)**

Seminar—3 hours; term paper. Theoretical, conceptual and analytic issues pertaining to social media research. Topics include motivation, participation, virality, and social-technical capital. Examination of social media in various contexts. Introduction to online behavioral data collection and analysis methods. Offered in alternate years.—F. Shen

**256. Communication Perspective on Video Games (4)**

Seminar—3 hours; term paper. Review of theory and research on the uses and effects of video games and virtual environments developed for entertainment and education. Study of the research methods available for documenting and measuring game use and effects on behavior. Offered in alternate years.—S. Peña, Shen

**259. Cognitive Approaches to Media (4)**

Seminar—3 hours; term paper. Restricted to graduate standing. Interdisciplinary examination of cognitive approaches to mediated communication. Application of studies on mediated message processing, cognitive and emotional information processing, psychophysiology, and neuroscience to mass communication. Review of media research and methods on attention, memory, motivation, and limited capacity. Offered in alternate years.—W. Yegian

**270. Diffusion of Innovations (4)**

Seminar—3 hours; term paper. Communication processes by which information and innovations spread through social systems. Models of diffusion, including spatial, network, time dependent, semantic and cognitive frameworks. Impact of communication

technologies on diffusion. Practical application of diffusion models in a variety of contexts. Offered in alternate years.—W. Barnett, Hilbert

**271. Communication Networks (4)**

Seminar—3 hours; term paper. Theoretical, conceptual, and analytic issues pertaining to network perspectives on communicating and organizing. Consideration of both structural and dynamic features of communication networks. Examination of the impact of emerging technologies on communication networks. Introduction to network analysis software.—S. (S.) Barnett, Shen

**280. Special Topics in Social Interaction (4)**

Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Reading, discussion, research, and writing on a selected topic in the specialty of social interaction. May be repeated for credit when topic differs. Offered irregularly.—S. Feng, Palomares

**281. Special Topics in Mediated Communication (4)**

Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Reading, discussion, research, and writing on a selected topic in the specialty of mediated communication. May be repeated for credit when topic differs. Offered irregularly.

**282. Special Topics in Health Communication (4)**

Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Reading, discussion, research and writing on a focused topic in health communication. May be repeated for credit when topic differs. Offered irregularly.—S.

**283. Special Topics in Organizational Communication (4)**

Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Reading, discussion, research, and writing on a selected topic in the specialty of organizational communication. May be repeated for credit when topic differs. Offered irregularly.

**298. Group Study (1-5)**

Lecture—3 hours. (S/U grading only.)

**299. Individual Study (1-12)**

(S/U grading only.)

**299R. Thesis Research (1-12)**

Independent study—3-36 hours. Prerequisite: graduate standing in Communication. (S/U grading only.)

**Professional****396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—Theobald

## Community and Regional Development

(College of Agricultural and Environmental Sciences)  
(Department of Human Ecology)

**Faculty**

See [Human Ecology](#), on page 373.

**The Major Program**

The Community and Regional Development major (formerly Applied Behavioral Sciences) aims to provide a broad comparative understanding of theories, methodologies, and issues relevant to the study of communities and the people in them. The program focuses on the ways that economic, political and socio-cultural forces are transforming regions and local communities, and it considers how knowledge can be used to improve the quality of community life.

**The Program.** Principal subjects of study within the major are community and organizational development, social change processes, the role of culture and ethnicity in shaping community life, community research methodologies, the impacts of innovation

and technology on community development, and the effects of social, economic and political systems on communities. The major is organized to allow students to develop fields of concentration that meet their career goals.

**Internships and Career Alternatives.** Community and Regional Development students are required to complete an internship in their field before graduation. Internships have been arranged with local, county, and state planning units, health departments, schools, housing offices, businesses, and education programs. Community and Regional Development graduates are prepared for occupations in community development, social research, program evaluation, organizational and educational consulting, city and regional planning, and for-profit organizations. The major also provides effective preparation for graduate or professional study in the social and behavioral sciences, or for professional degrees.

UC Davis students who wish to change their major to Community and Regional Development must be in good academic standing.

Students must have achieved a 2.00 GPA in any required upper-division course taken prior to declaring the major.

All courses satisfying the Preparatory Subject Matter, Depth Subject Matter, Area of Specialization options and English requirement must be taken for a letter grade.

### B.S. Major Requirements:

	UNITS
<b>Preparatory Subject Matter.....</b>	<b>22-26</b>
Community and Regional Development 1, 2 .....	8
Plant Sciences 21 or Computer Science	
Engineering 15 .....	3-4
Economics 1A or 1B .....	4
Anthropology 2 or Sociology 1 .....	4-5
Statistics 13 or 32 or Sociology 46B ....	3-5

<b>Depth Subject Matter .....</b>	<b>40-43</b>
<i>Core Issues in Community Development:</i> Three courses from: Community and Regional Development 142, 152, 153A or 153B or 153C, 164, 172, 176, or 180 .....	12-13
<i>Economics of Community Change:</i> Two courses from: Community and Regional Development 118, 140, 141, 162, or International Agricultural Development 103 .....	8
<i>Political Processes and Community Change:</i> Two courses from: Community and Regional Development 147, 149, 154, 157, 158, or 171 .....	8
<i>Methods for Community Research:</i> Two courses, including at least one *d course from: Community and Regional Development 151, *156, *Communication 102, *Education 114, *Landscapes and Architecture 150, *Sociology 103, *Sociology 106, *Statistics 102, *American Studies 100 .....	8-10
**Note on substitutions: supplementary list of pre-approved substitutions available in Advising Office.	
<i>Internship:</i> Community and Regional Development 192 .....	4

### Areas of Specialization

Take 20 units from each of two options, including at least one Community and Regional Development course from each option, or 40 units from one option, including at least two Community and Regional Development courses. These courses cannot overlap with the depth subject. Up to 4 units of variable-unit course work may be counted toward this requirement; e.g., Community and Regional Development 192.

### Global Communities Option .....

Students must consult with a faculty adviser to identify an emphasis within the option and to select suitable courses.

*Development Policy:* Anthropology 122B, 126A, 142, Agricultural and Resource Economics 115A, 115B, Community and Regional Development 140, 152, 153A, 153B, 153C, 164, 180, Economics 115A, 115B, 160A, 160B, 162, International Agricultural Development 170, Sociology 138, 139, 141, 145A, 159

*Gender and Development:* Sociology 132, 145A, 145B, Anthropology 126B, Women and Gender Studies 102, 182

*Globalization and Politics:* Political Science 124, 130, 131, 175

*Experiential Learning, Area Studies, and Language:* Total number of units of credit in Experiential learning, Area Studies, and Language courses cannot exceed 32.

Up to 12 credits transferred from any accredited foreign program or foreign internship, including UCD EAP and Summer Abroad programs.

Up to 12 credits in regional area studies classes; e.g., Middle East, China, Latin America.

Up to 12 credits for foreign language.

### Organization and Management Option .....

Students must consult with a faculty adviser to identify an emphasis within the option and to select suitable courses.

*Administration:* Community and Regional Development 157, 158, 194HA and 194HB, Agricultural and Resource Economics 100A, 171A, Economics 115A, Political Science 100, 105, 142A, 142B, 142C, 155, 183

*Communication:* Communication 134, 136, 140, 152, Community and Regional Development 147, 176, Education 120

*Human Resources:* Community and Regional Development 151, 172, 176, Communication 102, Economics 151B, Sociology 120, 128, 129

*Management:* Community and Regional Development 118, 140, 141, 154, 162, 164, Agricultural and Resource Economics 112, 113, History 174A, 174AD, Sociology 138, 139, 158, 159, 180A, 180B

### Policy, Planning, and Social Services Option .....

Students must consult with a faculty adviser to identify an emphasis within the option and to select suitable courses.

*General:* Community and Regional Development 118, 142, 151, 153A, 153B, 153C, 154, 156, 162, 176, 180, 194HA and 194HB, Environmental Science and Policy 165N, Political Science 100, 105, 108, 109, 142A, 142B, 142C, 154, 155, 183, Sociology 120, 140, 154, 155, 185

*Community Health and Counseling:* Communication 120, 122, 165, Community and Regional Development 164, Education 160A, 160B, Public Health Sciences 101, Human Development 120, 130, Psychology 123, 126, 151, 154, 162, 168, Sociology 154

*Education and Community:* Agricultural Education 100, 160, Communication 101, 146, Education 100, 110, 120, 151, 152, 153, Psychology 100, 132, Sociology 124

*Environmental Policy and Regional Planning:* Community and Regional Development 140, 141, 149, 152, 158, 171, Economics 115A, Environmental Science and Management 121, Environmental Science and Policy 110, 160, 161, 164, 166N, 168A, 168B, 171, 172, 173, 179, Political Science 102, 107, 175, Sociology 102, 118, 138, 141, 143A, 143B, 170

*Family and Community:* American Studies 152, Community and Regional Development 147, Human Development 100A, 100B, 100C, 101, 102, 103, 110, 130, 140,

140L, 141, 143, 160, 161, 163, Psychology 140, Sociology 122, 131, 134, 135, 152

Three courses in English Composition from the following list:

English 3, University Writing Program 1, 18, 19, 101, 102A, 102B, 102C, 102D, 102E, 102F, 102G, 102H, 102J, 102K, 102L, 104A, 104B, 104C, 104D, 104E, 104F, 104I, Communication 1, Comparative Literature 1, 2, 3, 4, or Native American Studies 5.

At least one course must be selected from:

University Writing Program 101, 102 and 104 series.

The Upper Division Composition Exam does not satisfy the requirement.

Advanced Placement English score of 4 or 5 which satisfies English 3 and/or University Writing Program 1 will satisfy one of the three required courses.

### Total Units for Major ..... 106-113

**Major Adviser.** M. Kenney,  
[mkenney@ucdavis.edu](mailto:mkenney@ucdavis.edu)

**Advising Center** for the major is located in 1303 Hart Hall 530-752-2244.

**Honors Program.** An Honors Program available to Human and Community Development majors who have demonstrated excellence in their field of study. Entrance into the honors program requires that a student have completed at least 135 units with a minimum grade point average of 3.500 in upper division courses counted toward the major. The program consists of a project whose specific nature is determined by consultation with the student's Honors Adviser. It may involve completion of a research project, a scholarly paper, a senior thesis, or some comparable assignment. The project will have a minimum duration of two quarters and will be noted on the student's record by a variable unit course number or special honors course designation. Successful completion of the honors program requires that a minimum of eight (8) units of credit be earned in course work for the project. It is expected that a student participating in the Honors Program of the Community Studies and Development will participate in the Undergraduate Research, Scholarship and Creative Activities Conference. Additionally, students participating in the Honors Program will be required to give a public presentation of their work in a departmental seminar program.

**Honors Program Adviser.** M. Kenney,  
[mkenney@ucdavis.edu](mailto:mkenney@ucdavis.edu)

### Minor Program Requirements:

The Community and Regional Development Program (Department of Human Ecology) offers the following minor:

#### UNITS

### Community Development ..... 24

Community and Regional Development 1 .....

4

Five courses selected from:

Community and Regional Development 118, 140, 141, 142, 147, 149, 151, 152, 153A, 153B, 153C, 154, 156, 157, 158, 162, 164, 171, 172, 176, 180..... 20

**Minor Adviser.** M. Kenney,  
[mkenney@ucdavis.edu](mailto:mkenney@ucdavis.edu)

**Graduate Study.** See [Graduate Studies](#), on page 120.

### Courses in Community and Regional Development (CRD)

#### Lower Division

##### 1. The Community (4)

Lecture—3 hours; discussion—1 hour. Basic concepts of community analysis and planned social change. The dynamics of community change through

case studies of communities including peasant, urban ghetto, suburban mainline, and California farm workers. GE credit: SocSci, Div, Wrt | ACGH, DD, OL, SS, VL, WE.—F, W. (F, W.) Tarallo

## **2. Ethnicity and American Communities (4)**

Lecture—3 hours; discussion—1 hour; extensive writing; term paper. Historical and cultural survey of the role of various ethnic groups in the development of American communities. Examines ethnicity as a cultural factor, ethnicity as power and issues related to selected American ethnic groups. GE credit: SocSci, Div, Wrt | ACGH, DD, SS, WE.—F, S. (F, S.)

## **20. Food Systems (4)**

Lecture—3 hours; laboratory—3 hours. Social aspects of agri-food systems. Social science perspectives applied to food and agricultural sustainability in relation to ecology, knowledge, technology, power, governance, labor, social difference, and social movements. Social and environmental effects of commodity chains in comparative global context. GE credit: SocSci, Wrt | OL, VL, SS, WE.—F. (F.) Galt

## **92. Internship (1-12)**

Internship—3-36 hours. Prerequisite: consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.)

## **98. Directed Group Study for Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

## **99. Special Study for Undergraduates (1-5)**

(P/NP grading only.)

## **Upper Division**

### **118. Technology and Society (4)**

Lecture—3 hours; discussion—1 hour; extensive writing; term paper. Prerequisite: course 1 or 2 or Sociology 1 or Anthropology 2. Impact of technology on labor relations, employment, industrial development and international relations. Internal relations of technology development and deployment. GE credit: SocSci | SS, WC, WE.—F. (F.) Kenney

### **140. Dynamics of Regional Development (4)**

Lecture—4 hours; extensive writing; term paper; project. Prerequisite: course 1 or 2 or Sociology 1 or Anthropology 2. Industrial cluster formation and institutions. Technology, labor relations and interfirm linkages in global value chains. California and other regions are used as case studies. GE credit: SocSci | SS, WE.—W. (W.) Kenney

### **141. Organization of Economic Space (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2 or Sociology 1 or Anthropology 2. Globalization and technological restructuring of economic activity focusing on new spatial patterns of production and circulation and their implications for workers, communities and societies, both in the U.S. and around the globe. GE credit: SocSci | SS, WC, WE.—F. (F.)

### **142. Rural Change in the Industrialized World (4)**

Lecture—3 hours; discussion—1 hour; extensive writing; term paper. Prerequisite: course 1 or 2 or Sociology 1 or Anthropology 2. Geography of rural environment with emphasis on rural restructuring. Demographics, community, economy, governance, agriculture, and environmental conservation in rural areas of industrialized world. Case studies from and comparisons drawn between North America, Europe, Australia, New Zealand, and Japan. GE credit: SocSci | SS, WE.—W. (W.) Galt

### **147. Community Youth Development (4)**

Lecture/discussion—4 hours; project; extensive writing or discussion; term paper. Community influences on youth well-being, youth as agents of community change, and policies to support healthy communities for young people. Special emphasis on disparities in youth well-being related to race, class, immigration

status, gender, sexual-orientation. Offered in alternate years. GE credit: SocSci, Div, Wrt | DD, OL, SS, VL, WE.—S. (S.) London

## **149. Community Development Perspectives on Environmental Justice (4)**

Lecture/discussion—4 hours; extensive writing or discussion; project; term paper. Environmental justice social movements; inequitable distribution of pollution on low-income communities of color; histories, policies, and innovations associated environmental justice movements in the United States and around the world. Offered in alternate years. GE credit: SocSci, Div, Wrt | DD, OL, SS, VL, WE.—S. (S.) London

## **151. Community Field Research: Theory and Analysis (4)**

Lecture—4 hours; extensive writing; project. Prerequisite: course 1; any upper division Community and Regional Development course is recommended. Emphasis on the design and analysis of community research considering the relationship between theory and practice. Study of community research methods, including structural analysis, elite interviewing, and ethnographic approaches. Course requires design and completion of field research project. GE credit: SocSci, Div, Wrt | ACGH, DD, OL, SS, VL, WE.—S. (S.) Tarallo

## **152. Community Development (4)**

Lecture—4 hours. Prerequisite: course 1 or 151 or Sociology 2 or Anthropology 2 or Asian American Studies 100 or Chicana/o Studies 132 or African American & African Studies 101. Introduction to principles and strategies of community organizing and development. Examination of non-profit organizations, citizen participation, approaches to reducing poverty, community needs assessment, and regional development strategies. GE credit: SocSci, Wrt | ACGH, DD, SS, WC, WE.—F. (F.) Brinkley

### **153A. International Community Development: Asia (4)**

Lecture—4 hours. Prerequisite: course 1 or Anthropology 2 or International Agricultural Development 10 or Sociology 1 or 2 or Political Science 1. Examination and analysis of community development efforts in Japan and the impact of global forces in different settings. Alternative strategies with emphasis on self-reliance and locally controlled development. Course is based in Kyoto, Japan, and includes field trips. GE credit: SocSci, Div | OL, SS, VL, WC, WE.—Su. (Su.) Fujimoto, Wiener

### **153B. International Community Development: Europe (4)**

Lecture—4 hours. Prerequisite: course 1 or 2 or Anthropology 2 or International Agricultural Development 10 or Sociology 1 or 2 or Political Science 1. Examination and analysis of community development efforts in Europe and the impact of global forces in different settings. Alternative strategies with emphasis on self-reliance and locally controlled development. Course is based in Freiburg, Germany, and includes field trips to France and Switzerland. GE credit: SocSci, Div | SS, WC.—Su. (Su.)

### **153C. International Community Development: Africa (4)**

Lecture—2 hours; fieldwork—2 hours. Prerequisite: course 1 or 2 or Anthropology 2 or International Agricultural Development 10 or Sociology 1 or 2 or Political Science 1. Examination and analysis of community development efforts in Africa and the impact of global forces in urban and rural settings. Focus on strategies that promote self-reliance and locally controlled development. Course based in South Africa, includes field trips. GE credit: SocSci, Div | SS, WC.—Su. (Su.)

### **154. Social Theory and Community Change (4)**

Lecture/discussion—4 hours; course 1 or Sociology 1 or Anthropology 2. Comparative overview of the dominant social science paradigms for the study of community development and change. Among the paradigms discussed are functionalism, conflict theory/Marxism, structuralism, methodological individualism, reflexive modernity. GE credit: SocSci, Div, Wrt | ACGH, DD, OL, SS, VL, WC, WE.—F, W. (F, W.) Lacy

ualism, reflexive modernity. GE credit: SocSci, Div, Wrt | ACGH, DD, OL, SS, VL, WC, WE.—F, W. (F, W.) Lacy

## **156. Community Economic Development (5)**

Lecture—4 hours; laboratory—2 hours. Prerequisite: course 152 or Plant Sciences 21 or Engineering Computer Sciences 15; consent of instructor. How low income communities work together to improve their economic well-being, increase their control over their economic lives, and build community power and decision-making. Includes techniques to analyze community economic potential and identification of appropriate intervention tools. Group project. GE credit: SocSci | QL, SS, WE.—W. (W.)

## **157. Politics and Community Development (4)**

Lecture—4 hours. Analyzes political, economic and sociocultural forces shaping the form and function of local communities in the U.S. Considers theories of the state, the community and social change and case studies of actual community development in comparative historical perspective. GE credit: SocSci, Div, Wrt | ACGH, DD, SS, WE.—F. (F.)

## **158. Small Community Governance (4)**

Lecture/discussion—3 hours; fieldwork—3 hours. Prerequisite: course 1 or Sociology 1 or Political Science 1. Governing institutions and political processes in rural and small urban places. Local government organization, community autonomy, leadership, political change, policy development, and select policy issues including public finance. Field research on political processes or policy issues in select communities. Offered in alternate years.—S. (S.) London

## **162. People, Work and Technology (4)**

Lecture—4 hours. Prerequisite: course 1 or Sociology 1 or Anthropology 2; upper division standing recommended. Restricted to upper division standing. Analysis of the relationship between work, technology, and human experience. Theories of the causes and consequences of labor process change; impacts of race/ethnicity, class, gender, and citizenship status on work; responses of workers, communities, and policy-makers to workplace changes.—F, W. (F, W.) Visser

## **164. Theories of Organizations and Their Roles in Community Change (5)**

Lecture—4 hours; laboratory—2 hours. Prerequisite: course 1 or 2 or Sociology 1 or Anthropology 2; Statistics 13 or 13V or Sociology 46B. Planned change within and through community organizations. Private voluntary organizations, local community associations, and local government. Relationship between community organizations and social capital. Collaborative original data gathering and professional report writing. GE credit: SocSci | ACGH, DD, OL, SS, VL, WE.—W. (W.) Brinkley

## **171. Housing and Social Policy (4)**

Lecture—4 hours; term paper. Social impact, economics, and politics of housing in the United States. Special attention given to federal, state, and local policy and program strategies to produce and preserve affordable housing and inclusive neighborhoods.—S. (S.) Wiener

## **172. Social Inequality: Issues and Innovations (4)**

Lecture/discussion—4 hours; extensive writing; term paper; project. Prerequisite: course 1 or 2 or Sociology 1 or Anthropology 2; upper division standing recommended. Focus on the dimensions, causes, and means of alleviating social inequality in the U.S. Examination and analysis of major theories and forms (class, race/ethnicity, gender, and citizenship status) of inequality. Policy-based and grassroots approaches to change.—S. (S.) Visser

## **176. Comparative Ethnicity (4)**

Lecture—4 hours; term paper. Prerequisite: course 1 or 2 or Sociology 1 or Anthropology 2 and upper division standing recommended. Role of ethnicity in shaping social systems and interaction. Analytical approaches to and issues arising from the study of

ethnicity, through utilization of data from a range of different societies. GE credit: SocSci, Div, Wrt | ACGH, DD, SS, WC, WE.—S. (S.) Guarnizo

### **180. Transnational Community Development (4)**

Lecture/discussion—4 hours; extensive writing; project; term paper. Prerequisite: course 1, or Anthropology 2, or Sociology 1. The effects of grassroots, non-state, non-corporate actors from abroad on local, national and international development. Socioeconomic, political, and cultural implications of transnational actions undertaken by international non-governmental organizations, individual migrants, and migrant grassroots civic organizations. GE credit: SocSci | SS, WC, WE.—S. (W.) Guarnizo

### **192. Internship (1-12)**

Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.)

### **194HA. Special Study for Honors Students (4)**

Independent study—3 hours; seminar—1 hour; project; term paper. Prerequisite: completion of 135 units at the time of enrollment; GPA 3.500 in the major; GPA 3.300 in overall standing; completion of at least four upper division courses; agreement of a faculty member to serve as thesis adviser; consent of instructor. Community and Regional Development Honors is a program of direct reading, research and writing culminating in the preparation of a Senior Honors Thesis under the direction of a faculty adviser. (Deferred grading only, pending completion of sequence.)—F, W. (F, W.) Kenney

### **194HB. Special Study for Honors Students (4)**

Independent study—3 hours; seminar—1 hour; project; term paper. Prerequisite: completion of 135 units at the time of enrollment; GPA 3.500 in the major; GPA 3.300 in overall standing; completion of at least four upper division courses; agreement of a faculty member to serve as thesis adviser; consent of instructor. Community and Regional Development Honors is a program of direct reading, research and writing culminating in the preparation of a Senior Honors Thesis under the direction of a faculty adviser. (Deferred grading only, pending completion of sequence.)—F, W. (F, W.) Kenney

### **197T. Tutoring in Community and Regional Development (1-5)**

Tutorial—3-15 hours. Prerequisite: upper division standing; completion of course to be tutored; consent of instructor. Assisting instructor in one of the Community and Regional Development's regular courses by tutoring individual students or small groups of students in a laboratory, in voluntary discussion groups, or other voluntary activities. May be repeated up to 10 units for credit. Offered irregularly. (P/NP grading only.)—F, W, S, Su.

### **198. Directed Group Study (1-5)**

(P/NP grading only.)

### **199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.)

## **Graduate**

### **240. Community Development Theory (4)**

Lecture/discussion—4 hours. Introduction to theories of community development and different concepts of community, poverty, and development. Emphasis on building theory, linking applied development techniques to theory, evaluating development policy, and examining case studies of community development organizations and projects. (Same course as Geography 240.)—F, (F.)

### **241. The Economics of Community Development (4)**

Seminar—4 hours. Prerequisite: graduate standing. Economic theories and methods of planning for communities. Human resources, community services and infrastructure, industrialization and technological

change, and regional growth. The community's role in the greater economy. (Same course as Geography 241.) Offered irregularly.—Kenney

### **242. Community Development Organizations (4)**

Seminar—4 hours. Prerequisite: course 240. Class size limited to 15 students. Theory and praxis of organizations with social change agendas at the community level. Emphasis on non-profit organizations and philanthropic foundations.—S. (S.) Hirtz

### **242S. Community Development Organizations (International) (4)**

Fieldwork—10 hours; lecture—5 hours; workshop—5 hours. Prerequisite: course 240. Class size limited to 10 students. Theory and praxis of organizations with social change agendas at the community level. Emphasis on local governance, non-profit organizations and philanthropic foundations at an international level.—Su. (Su.) Hirtz

### **244. Political Ecology of Community Development (4)**

Lecture—4 hours. Prerequisite: graduate standing. Community development from the perspective of geographical political ecology. Social and environmental outcomes of the dynamic relationship between communities and land-based resources, and between social groups. Cases of community conservation and development in developing and industrialized countries. (Same course as Geography 254.)—W. (W.) Galt

### **245. The Political Economy of Urban and Regional Development (4)**

Lecture—4 hours. Prerequisite: course 157, 244, or the equivalent. How global, political and economic restructuring and national and state policies are mediated by community politics; social production of urban form; role of the state in uneven development; dynamics of urban growth and decline; regional development in California. (Same course as Geography 245.)—S. (S.)

### **246. The Political Economy of Transnational Migration (4)**

Lecture—4 hours. Prerequisite: graduate standing. Theoretical perspectives and empirical research on social, cultural, political, and economic processes of transnational migration to the U.S. Discussion of conventional theories will precede contemporary comparative perspectives on class, race, ethnicity, citizenship, and the ethnic economy. (Same course as Geography 246.)—W. (W.) Guarnizo

### **247. Transformation of Work (4)**

Lecture/discussion—4 hours. Prerequisite: graduate standing in history or social science degree program or consent of instructor. Exploration of the ways that the experience, organization, and systems of work are being reconfigured in the late twentieth century. The impacts of economic restructuring on local communities and workers.—F. (F.) Visser

### **248. Social Policy, Welfare Theories and Communities (4)**

Seminar—4 hours. Prerequisite: graduate standing. Theories and comparative histories of modern welfare states and social policy in relation to legal/normative, organizational, and administrative aspects. Analysis of specific social issues within the U.S./California context. Not open for credit to students having completed Community & Regional Development 248A and 248B. (Same course as Geography 248.) Offered in alternate years.—(S.) Hirtz

### **248A. Social Policy, Welfare Theories and Communities I (2)**

Seminar—2 hours. Prerequisite: graduate standing. Theories and comparative histories of modern welfare states. Theories of welfare and social policy in relation to normative, organizational, and administrative aspects of welfare and social policy. Offered in alternate years.—Hirtz

### **248B. Social Policy, Welfare Theories and Communities II (2)**

Seminar—2 hours. Prerequisite: graduate standing. Concurrent enrollment in course 248A. Analysis of a specific set of social issues within the U.S./Califor-

nia context. Issues may include poverty, hunger, housing, health, family, disability, economic opportunity, affirmative action orientations, gender, old age, or special social groups. Offered in alternate years.—Hirtz

### **249. Media Innovation and Community Development (4)**

Seminar—4 hours. Restricted to graduate students. Role of innovative media in communities and social change. Studies historical, practical and theoretical issues involving media in community organizing, social justice movements, democracy initiatives, and economic justice.—S. (S.)

### **250. Professional Skills for Community Development (4)**

Lecture/discussion—2 hours; project—2 hours; fieldwork; extensive writing or discussion. Prerequisite: course 240. Priority enrollment for Masters and Ph.D. students in Community and Regional Development. Help students develop the practical skills needed to work professionally in organizations that are involved in community development. Provides an overview of community development planning, project management, and consultation skills.—W. (W.) Benner, Hirtz, London

### **290. Seminar (1)**

Seminar—1 hour. Analysis of research in applied behavioral sciences. (S/U grading only.)—F, W, S. Hirtz

### **292. Graduate Internship (1-12)**

Internship—3-36 hours. Individually designed supervised internship, off campus, in community or institutional setting. Developed with advice of faculty mentor. (S/U grading only.)

### **293. Community Development Graduate Proseminar (1)**

Lecture/discussion—1 hour. Prerequisite: enrollment in Community Development graduate group. Restricted to first year Community Development graduate students only. Introduction to graduate training in Community Development. Seminar designed to introduce students entering graduate work in the Community Development Graduate Group to its ongoing activities. (S/U grading only.)—F. (F.) Galt

### **298. Group Study (1-5)**

### **299. Research (1-12)**

(S/U grading only.)

## **Professional**

### **396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## **Professional**

### **440. Professional Skills for Community Development (4)**

Seminar—4 hours. Prerequisite: course 240. The intersection of theory and case studies to develop practical skills needed to work as a professional community developer, program administrator, and/or policy consultant.—W. (W.) Bradshaw

## **Community Development (A Graduate Group)**

Michael Rios, Ph.D., Chairperson of the Group

**Group Office.** Carrie Armstrong-Rupert, Student Affairs Officer; 133 Hunt (Community Development Graduate Group); 530-752-4119; [carupert@ucdavis.edu](mailto:carupert@ucdavis.edu); <http://communitydevelopment.ucdavis.edu>

## **Faculty**

Heidi Ballard, Ph.D., Associate Professor  
(Education)

Natalia Deeb-Sossa, Ph.D., Associate Professor  
(Chicana/o Studies)

David de la Pena, Ph.D., Assistant Professor (*Human Ecology*)  
 Adela De La Torre, Ph.D., Professor (*Chicana/o Studies*)  
 Jesse Drew, Ph.D., Associate Professor (*Techno-Cultural Studies*)  
 Patsy Eubanks-Owens, M.L.A., Professor (*Human Ecology*)  
 Yvette Flores-Ortiz, Ph.D., Professor (*Chicana/o Studies*)  
 Ryan E. Galt, Ph.D., Associate Professor (*Human Ecology*)  
 Liza Grandia, Ph.D., Associate Professor (*Native American Studies*)  
 Luis Guarinzo, Ph.D., Professor (*Human Ecology*)  
 Susan Handy, Ph.D., Professor (*Environmental Science and Policy*)  
 Bruce Haynes, Ph.D., Associate Professor (*Sociology*)  
 Paul Heckman, Ph.D., Professor (*School of Education*)  
 Robin Hill, Ph.D., Professor (*Art, Art History*)  
 Carlos Jackson, M.F.A., Associate Professor and Chair (*Chicana/o Studies*)  
 Susan B. Kaiser, Ph.D., Professor (*Women's Studies/Textiles and Clothing*)  
 Martin Kenney, Ph.D., Professor (*Human Ecology*)  
 David Kyle, Ph.D., Associate Professor (*Sociology*)  
 William Lacy, Ph.D., Professor, Vice Provost (*Human Ecology, Outreach and International Programs*)  
 Jonathan London, Ph.D., Associate Professor (*Human Ecology*)  
 Mark Lubell, Ph.D., Professor (*Environmental Sciences and Policy*)  
 Beth Rose Middleton, Ph.D., Assistant Professor (*Native American Studies*)  
 Brett Milligan, M.L.A., Assistant Professor (*Human Ecology*)  
 N. Claire Napawan, M.L.A., Assistant Professor (*Human Ecology*)  
 Bettina Ng'wenya, Ph.D., Associate Professor (*African American African Studies*)  
 Deb Niemeier, Ph.D., Professor (*Civil and Environmental Engineering*)  
 Michael Rios, Ph.D., Associate Professor (*Human Ecology*)  
 Sheryl-Anne Simpson, Ph.D., Assistant Professor (*Human Ecology*)  
 Julie Sze, Ph.D., Associate Professor (*American Studies*)  
 Tom Tomich, Ph.D., Professor (*Human Ecology*)  
 M. Anne Visser, Ph.D., Assistant Professor (*Human Ecology*)  
 Karen Watson-Gegeo, Ph.D., Professor (*School of Education*) Distinguished Graduate Mentoring Award  
 Stephen Wheeler, Ph.D., Professor (*Human Ecology*)  
 Diane Wolf, Ph.D., Professor (*Sociology*)

### Affiliated Faculty

David Campbell, Ph.D., Specialist in Cooperative Extension (*Human Ecology*)  
 Gail Feenstra, Ph.D., Food Systems Analyst (SAREP)  
 Shermain Hardesty, Ph.D., Specialist in Cooperative Extension (*Agricultural and Resource Economics*)  
 Jeff Loux, Ph.D., Director (*Land Use and Natural Resources, UC Davis Extension*)  
 Deborah Paterniti, Ph.D., Associate Adjunct Professor (*UCDHS: Center for Healthcare Policy and Research*)  
 Carolyn Penny, Ph.D., Director (*Chancellor and Provost Office*)  
 Bernadette Tarallo, Ph.D., Continuing Lecturer (*Human Ecology*)  
 Mark Van Horn, Director (*PSTC/SF*)

### Emeriti Faculty

Stephen Brush, Ph.D., Professor Emeritus (*Human Ecology*)  
 Deborah Elliott-Fisk, Ph.D., Sr. Lecturer SOE, Emeritus (*Wildlife, Fish, and Conservation Biology*)

Mark Francis, M.L.A., Professor Emeritus (*Human Ecology*)  
 Isao Fujimoto, M.A., Lecturer SOE Emeritus (*Human Ecology*)  
 James I. Grieshop, Ph.D., Specialist in Cooperative Extension Emeritus (*Human Ecology*)  
 Joyce Gutstein, Ph.D., Director (*Public Service Research Program*)  
 Frank Hirtz, Ph.D., Sr. Lecturer SOE (*Human Ecology*)  
 Janet D. Momsen, Ph.D., Professor Emerita (*Human Ecology*)  
 Ben Orlove, Ph.D., Professor Emeritus (*Environmental Sciences and Policy*)  
 Dennis Pendleton, Ph.D., Dean (*UC Davis Extension*)  
 Michael P. Smith, Ph.D., Distinguished Professor Emeritus (*Human Ecology*)  
 Alvin D. Sokolow, Ph.D., Extension Specialist Emeritus (*Human Ecology*)  
 Geoffrey A. Wandesforde-Smith, Ph.D., Associate Professor Emeritus (*Political Science, Environmental Science and Policy*)  
 Miriam J. Wells, Ph.D., Professor Emerita (*Human Ecology*)

**Graduate Study.** The Graduate Group in Community Development offers a multidisciplinary program of study which leads to the M.S. degree. The program helps students link conceptual knowledge with cutting edge practical experience so they can influence the social, economic, cultural and political forces that affect the well-being of people living in community settings whether small towns or large cities, whether in the United States or elsewhere in the world. Graduate study in community development also prepares individuals to work within government or non-profit organizations in the realm of social and economic change, or to prepare them for further doctoral studies in related programs. Particular strengths of the program include: urban political development and change; sustainable agriculture and food systems; community organizing and organizations in under-served communities; community economic development; environmental conservation and planning; local impacts of globalization and trans-nationalism.

**Preparation.** Applicants to this program can prepare themselves by enrolling for upper division courses in the social or behavioral sciences, e.g., anthropology, economics, sociology, psychology, geography, urban studies or political science, and courses in community studies.

**Graduate Advisers.** Contact the Group office.

## Community Nutrition

See **Nutrition Science, on page 494.**

## Comparative Literature

(College of Letters and Science)

Juliana Schiesari, Chairperson of the Department

**Department Office.** 213 Sproul Hall;  
 530-752-1219; <http://complit.ucdavis.edu>

### Faculty

Joshua Clover, Ph.D., Professor (*Comparative Literature, English*)  
 Gail Finney, Ph.D., Professor (*Comparative Literature, German and Russian*) Academic Senate Distinguished Teaching Award  
 Noah Guynn, Ph.D., Professor (*Comparative Literature, French and Italian*)  
 Ralph Hexter, Ph.D., Professor (*Classics, and Comparative Literature*)  
 Neil Larsen, Ph.D., Professor  
 Kari Lokke, Ph.D., Professor

Sheldon Lu, Ph.D., Professor  
 Noha Radwan, Ph.D., Assistant Professor  
 Cheri Ross, Ph.D., Senior Lecturer  
 Juliana Schiesari, Ph.D., Professor (*Comparative Literature, French and Italian*)  
 Brenda Schildgen, Ph.D., Professor UC Davis Prize for Teaching and Scholarly Achievement  
 Jocelyn Sharlet, Ph.D., Associate Professor  
 Archana Venkatesan, Ph.D., Assistant Professor (*Comparative Literature, Religious Studies*)

### Emeriti Faculty

Manfred Kusch, Ph.D., Senior Lecturer Emeritus (*Comparative Literature, French and Italian*)  
 Scott McLean, Ph.D., Lecturer  
 Seth L. Schein, Ph.D., Professor Emeritus  
 Robert M. Torrance, Ph.D., Professor Emeritus

### The Major Program

Comparative Literature is a dynamic major whose own self-definition is constantly shifting. Once mostly limited to the study of western European literature and its Greco-Roman classical past, today Comparative Literature has become a global interdisciplinary study of literature in original languages and other media (including cinema, television, fine arts, and opera, for example). Thus, we can define Comparative Literature as the study of literature and culture across national boundaries and throughout historical time.

**The Program.** Both the major and the minor programs in Comparative Literature allow students to combine courses in one or more national literature departments with courses in Comparative Literature. The introductory course sequence (COM 1 through 4) provides both an overview of ancient to contemporary literature and film and offers intensive practice in analytical thought. In addition, any one of the courses in the sequence satisfies the university composition requirement. All readings in undergraduate Comparative Literature courses are in English, but majors take upper division courses in at least one foreign literature in the original language.

Students majoring in Comparative Literature choose a first and second literature of concentration, one of which may be English. After the introductory sequence, each student's major course work is divided between courses in the two literatures of concentration and Comparative Literature courses. These Comparative Literature courses encourage students to take a broad view of a historical period, a theme, a genre, or a literary movement. The wide variety of options in the program permits great flexibility and encourages interdisciplinary connections among literature and philosophy, psychology, history, and the arts. Each student's plan of study must be approved by the major adviser at the beginning and end of each calendar year.

**Career Alternatives.** A Comparative Literature major offers an excellent enhancement to pre-professional training, preparing students for graduate study in medicine, dentistry, veterinary medicine, and other science fields as well as law and business, besides of course journalism and publishing, teaching, or graduate study in literature.

### A.B. Major Requirements:

UNITS

#### Preparatory Subject Matter ..... 16-46

Comparative Literature 1 or 2; 3 or 4 .....	8
Two other lower division courses in Comparative Literature (selected from 1-53C excluding the 10 series. Cannot include the two required courses in the 1-4 series).	
It is recommended that students who do not use a European language toward the major take one of the remaining required lower division courses in the 53 series, preferably the 53 course that relates to the region of the language the student is using to satisfy the upper division language requirement in the major.....	8

Foreign language: sufficient preparation to ensure satisfactory performance at the upper division level..... 0-30

#### **Depth Subject Matter ..... 40**

Five upper division Comparative Literature courses including at least one course in a major period (such as 164A-164B-164C-164D), movement (such as 168A-168B, 169) or genre (such as 160A-160B, 161A-161B, 163, 166A-166B) and including the following required courses:

Comparative Literature 141 (recommended for the junior year); Comparative Literature 195 (to be taken in the spring quarter before graduation) ..... 20

Three upper division literature courses in a language other than English ..... 12

Two additional upper division literature courses in Comparative Literature or in any other program including English or literature in translation..... 8

#### **Total Units for the Major ..... 56-86**

**Major Adviser.** Consult the Department office.

#### **Minor Program Requirements:**

The minor in Comparative Literature allows students to combine courses in Comparative Literature with courses in a national literature, including English or foreign literature in translation. There is no foreign language requirement for the minor.

UNITS

#### **Comparative Literature ..... 24**

Comparative Literature 1, 2, 3, or 4..... 4

At least five upper division literature courses, at least four of which are in Comparative Literature; Comparative Literature 141 and 195 recommended..... 20

Courses should be chosen in consultation with, and with the approval of, the adviser.

**Minor Adviser.** Consult the Department office.

**Advising.** All Comparative Literature majors and minors must consult with their adviser, individually, at least once at the beginning and once at the end of each academic year.

**Honors and Honors Program.** Students, who meet the grade point requirement for graduation with honors and complete the requirements established by the College of Letters and Science, may be recommended by the department for graduation with high honors or highest honors on the basis of an evaluation of their academic achievements in the major and in the honors project in particular. Entrance into the honors program requires that a student have completed at least 135 units with a minimum grade point average of 3.500 in courses counted toward the major.

Candidates must write a senior thesis under the direction of a faculty member approved by the major adviser. For this purpose, in addition to fulfilling all other major requirements, honors candidates must enroll in 6 units of Comparative Literature 194H during the first two quarters of the senior year.

**Teaching Credential Subject Representative.** See the Teaching Credential/M.A. Program on page 124.

**Education Abroad Options.** The department of Comparative Literature encourages students to study abroad, in the Summer Abroad program, the Quarter Abroad Program, or the Education Abroad Program. With the approval of a major adviser, applicable courses taken abroad may be accepted in the major or minor programs.

**Graduate Study.** The Comparative Literature Program offers the Ph.D. degree with a strong emphasis on individual research under the supervision of a faculty member. Candidates for the Ph.D., in addition to research of a comparative nature, study three literatures (one of which may be English and/or American) in the original languages, acquiring an extensive knowledge of the overall development of

one. Students may choose to focus on a special topic instead of on a third literary tradition.

Within this framework, each student's program will be tailored to individual interests, and may center on a major historical period, such as the Renaissance or the modern age; a genre, such as lyric poetry, epic, drama, or the novel; or any other special emphasis approved by the Graduate Adviser.

**Preparation.** For admission to the Ph.D. Program candidates should have an undergraduate major in literature and reading ability in three foreign languages. The Group requires three letters of recommendation and a sample of recent written work, and it is recommended that students submit their GRE scores.

**Graduate Adviser.** S. Lu

#### **Courses in Comparative Literature (COM)**

**Note.** Many courses in Comparative Literature require that students have met the Entry Level Writing Requirement (ELWR) for the University of California.

#### **Lower Division**

##### **1. Major Books of Western Culture: The Ancient World (4)**

Lecture/discussion—4 hours. Prerequisite: completion of Entry Level Writing Requirement. Introduction, through class discussion and frequent written assignments, to some of the major books of western civilization such as The Odyssey, Aeneid, Bible, and Augustine's Confessions. GE credit: ArtHum, Wrt | AH, WC, WE.

##### **2. Major Books of Western Culture: From the Middle Ages to the Enlightenment (4)**

Lecture/discussion—4 hours. Prerequisite: completion of Entry Level Writing Requirement. Introduction to the methods of inquiry applied to critical reading and the practice of writing. Focus on texts from the European Middle Ages to the eighteenth century; critical analysis of the historical-cultural developments in this period. GE credit: ArtHum, Wrt | AH, WC, WE.

##### **3. Major Books of Western Culture: The Modern Crisis (4)**

Lecture/discussion—4 hours. Prerequisite: completion of Entry Level Writing Requirement. Introduction, through class discussion and frequent written assignments, to the major literature and thought of the late eighteenth to the mid-twentieth century. GE credit: ArtHum, Wrt | AH, WC, WE.

##### **4. Major Books of the Contemporary World (4)**

Lecture/discussion—4 hours. Prerequisite: completion of entry level writing requirement. Comparative study of selected major Western and non-Western texts composed in the period from 1945 to the present. Intensive focus on writing about these texts, with frequent papers written about these works. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.

##### **5. Fairy Tales, Fables, and Parables (4)**

Lecture—3 hours; discussion—1 hour. An introduction to fairy tales, fables, and parables as recurrent forms in literature, with such readings as tales from Aesop and Grimm, Chaucer and Shakespeare, Kafka and Borges, Buddhist and Taoist parables, the Arabian Nights, and African American folklore. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Schildgen, Sharlet

##### **6. Myths and Legends (4)**

Lecture—3 hours; discussion—1 hour. Introduction to the comparative study of myths and legends, excluding those of Greece and Rome, with readings from Near Eastern, Teutonic, Celtic, Indian, Japanese, Chinese, African and Central American literary sources. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

##### **7. Literature of Fantasy and the Supernatural (4)**

Lecture—3 hours; discussion—1 hour. The role of fantasy and the supernatural in literature: tales of magic, hallucination, ghosts, and metamorphosis,

including diverse authors such as Shakespeare, P'u Sung-Ling, Kafka, Kawabata, Fuentes, and Morrison. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

#### **8. Utopias and their Transformations (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: completion of entry level writing requirement. A consideration, in literary works from different ages, of visionary and rational perceptions of a lost paradise, Golden Age, or Atlantis—and of the inhuman nightmares that can result from perversions of the utopian dream of perfection. GE credit: ArtHum, Wrt | AH, WC, WE.

#### **9. The Short Story and Novella (4)**

Lecture/discussion—3 hours; term paper. An introduction to shorter forms of prose fiction by major authors of different countries, with special emphasis on the modern period. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

#### **10A. Master Authors in World Literature; Gilgamesh, Ramayana, Beowulf, Nibelungenlied (2)**

Lecture/discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Gilgamesh, Ramayana, Beowulf, Nibelungenlied. May be repeated for credit in different subject area. (P/NP grading only.)

#### **10B. Master Authors in World Literature; Metamorphoses, Decameron, Arabian Nights, Canterbury Tales (2)**

Lecture/discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Metamorphoses, Decameron, Arabian Nights, Canterbury Tales. (P/NP grading only.)

#### **10C. Master Authors in World Literature; Chanson de Roland, El Cid, Igor's Campaign, Morte D'Arthur (2)**

Lecture/discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Chanson de Roland, El Cid, Igor's Campaign, Morte D'Arthur. May be repeated for credit in different subject area. (P/NP grading only.)

#### **10D. Master Authors in World Literature; Sakuntala, Tristan and Isolde, Aucassin and Nicolette, Gawain and the Green Knight (2)**

Lecture/discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Sakuntala, Tristan and Isolde, Aucassin and Nicolette, Gawain and the Green Knight. May be repeated for credit in different subject area. (P/NP grading only.)

#### **10E. Master Authors in World Literature; Swift, Rabelais, La Celestina, Simplicissimus (2)**

Lecture/discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Swift, Rabelais, La Celestina, Simplicissimus. May be repeated for credit in different subject area. (P/NP grading only.)

#### **10F. Master Authors in World Literature; Cervantes, Saikaku, Fielding, Voltaire (2)**

Lecture/discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Cervantes, Saikaku, Fielding, Voltaire. May be repeated for credit in different subject area. (P/NP grading only.)

**10G. Master Authors in World Literature; Machiavelli, Shakespeare, Lope de Vega/ Calderón, Molière/Racine, Lessing/Schiller (2)**

Lecture/discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Machiavelli, Shakespeare, Lope de Vega/ Calderón, Molière/Racine, Lessing/Schiller. May be repeated for credit in different subject area. (P/NP grading only.)

**10H. Master Authors in World Literature; Goethe, Byron, Stendhal, Pushkin, Lermontov (2)**

Lecture/discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Goethe, Byron, Stendhal, Pushkin, Lermontov. May be repeated for credit in different subject area. (P/NP grading only.)

**10I. Master Authors in World Literature; Hoffmann, Gogol, Poe, Hawthorne, Maupassant, Chekhov, Melville (2)**

Lecture/discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Hoffmann, Gogol, Poe, Hawthorne, Maupassant, Chekhov, Melville. May be repeated for credit in different subject area. (P/NP grading only.)

**10J. Master Authors in World Literature; Flaubert, Twain, Turgenev, Galdós, Ibsen (2)**

Lecture/discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Flaubert, Twain, Turgenev, Galdós, Ibsen. May be repeated for credit in different subject area. (P/NP grading only.)

**10K. Master Authors in World Literature; Balzac, Dostoevski/Tolstoi, Hardy, Shaw, Strindberg (2)**

Lecture/discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Balzac, Dostoevski/Tolstoi, Hardy, Shaw, Strindberg. May be repeated for credit in different subject area. (P/NP grading only.)

**10L. Master Authors in World Literature; Unamuno, Svevo, Conrad, Gide, Kafka, Faulkner (2)**

Lecture/discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Unamuno, Svevo, Conrad, Gide, Kafka, Faulkner. May be repeated for credit in different subject area. (P/NP grading only.)

**10M. Master Authors in World Literature; Rilke/Yeats, Joyce/Woolf, Mann/Céline, Bulgakov/Tanizaki, O'Neill/Brecht, Lorca/Pirandello (2)**

Lecture/discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Rilke/Yeats, Joyce/Woolf, Mann/Céline, Bulgakov/Tanizaki, O'Neill/Brecht, Lorca/Pirandello. May be repeated for credit in different subject area. (P/NP grading only.)

**10N. Master Authors in World Literature; Camus/Sartre, García Márquez/Grass, Borges/Sarrate, Bellow/Nabokov, Beckett/Pinter, Genet/Dürrenmatt (2)**

Lecture/discussion—1 hour. Limited enrollment. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: Camus/Sartre, García Márquez/Grass, Borges/Sarrate, Bellow/Nabokov, Beckett/Pinter, Genet/Dürrenmatt. May be repeated for credit in different subject area. (P/NP grading only.)

**11. Travel and the Modern World (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: completion of entry level writing requirement. Examination of travel as a quintessential human activity and experience of global modernity and cross-cultural encounters from the 18th to the 21st century with an emphasis on German-speaking culture. Travelogues, literature, art, memoirs, and films in English translation. (Same course as German 11.) GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.—F, W, S. (F, W, S.) Zhang

**12. Introduction to Women Writers (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: completion of entry level writing requirement. Survey of fiction, drama, and poetry by women writers from all continents. Concerns of women compared in light of their varied social and cultural traditions. Literary analysis of voice, imagery, narrative strategies and diction. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Lokke

**13. Dramatic Literature (3)**

Lecture—3 hours. Prerequisite: completion of entry level writing requirement. Introduction, through careful reading of selected plays, to some of the major forms of Western drama, from the earliest tragedies of ancient Greece to the contemporary American theater. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

**14. Introduction to Poetry (3)**

Lecture/discussion—3 hours. Prerequisite: completion of entry level writing requirement. Comparative study of poetry in a variety of lyric and other poetic forms from different historical periods and different linguistic, national, and cultural traditions. GE credit: ArtHum, Wrt | AH, WC, WE.

**20. Humans and the Natural World (4)**

Lecture/discussion—3 hours; term paper. Changing relationship between humans and the natural environment in ancient and modern authors as Virgil, Li Po, Basho, Darwin, and Thoreau. GE credit: ArtHum, Wrt | AH, WC, WE.

**24. Animals in Literature (4)**

Lecture—3 hours; term paper or discussion. Prerequisite: completion of Entry Level Writing Requirement. Study of literary texts from various periods and cultures whose theme is the representation of animals. GE credit: ArtHum | AH, WC, WE.—Schiesari

**25. Ethnic Minority Writers in World Literature (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: ELWR (Entry Level Writing Requirement). Consideration of a broad range of writers who speak from an ethnic perspective different from the nominally or politically dominant culture of their respective countries and who explore the challenges faced by characters significantly affected by their ethnic minority status. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

**53A. Literature of East Asia (4)**

Lecture—3 hours; term paper. Introduction to representative masterpieces of East Asia with readings from such works as The Story of the Stone, The Peach Blossom Fan, T'ang and Sung poetry, classical Japanese poetry, drama, and travel diaries, and The Tale of Genji. GE credit: ArtHum, Div, Wrt | AH, OL, WC, WE.

**53B. Literature of South Asia (4)**

Lecture—3 hours; term paper. Introduction to representative masterpieces of South Asia with readings from such works as the Mahabharata and

Ramayana, The Cloud Messenger, Shakuntala, The Little Clay Cart, and the stories and poems of both ancient and modern India and Southeast Asia. GE credit: ArtHum, Div, Wrt | AH, OL, WC, WE.—Schilddgen

**53C. Literatures of the Islamic World (4)**

Lecture—3 hours; term paper. Introduction to classical Islamic culture through translations of literature primarily from Arabic and Persian, as well as other languages. Topics include the concept of the self, society and power, spirituality, the natural world, the cosmos, and the supernatural. GE credit: ArtHum, Div, Wrt | AH, OL, WC, WE.—Sharlet

**90X. Lower Division Seminar (1-2)**

Seminar—1-4 hours. Prerequisite: consent of instructor. Examination of a special topic in a small group setting.

**98. Directed Group Study (1-5)**

Restricted to lower division students. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5)**  
(P/NP grading only.)

**Upper Division**

**100. World Cinema (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: upper-division standing, or consent of instructor. A comparative, cross-cultural study of a topic, theme, or movement in world cinema beyond the boundary of a single national tradition. Topics may include "postsocialist cinemas in East Europe and Asia," "cinema and globalization," and "popular Asian cinemas." May be repeated three times for credit when topics differ. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.—Lu

**110. Hong Kong Cinema (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: upper-division standing, or consent of instructor. Hong Kong cinema, its history, industry, styles, genres, directors, and stars. Special attention to its polyglot, multicultural, transnational, colonial, and postcolonial environment. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.—Lu

**120. Writing Nature: 1750 to the Present (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: completion of entry level writing requirement. Study of representations, descriptions, and discussions of humankind's problematical relationship with the non-human world in texts written in a variety of European and American traditions between 1750 and the present. GE credit: ArtHum, Wrt | AH, WC, WE.—S. (S.)

**135. Women Writers (4)**

Lecture/discussion—3 hours; term paper. An exploration of women's differing views of self and society as revealed in major works by female authors of various times and cultures. Readings, principally of fiction, will include such writers as Lady Murasaki, Mme de Lafayette, and Charlotte Bronte. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Lokke, Schiesari

**138. Gender and Interpretation in the Renaissance (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: completion of entry level writing requirement. Critical analysis of Renaissance texts with primary focus on issues such as human dignity, education and gender politics; "high" and "low" culture and its relation to literary practices. (Same course as Italian 141.) GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Schiesari

**139. Shakespeare and the Classical World (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: completion of entry level writing requirement. Shakespeare's representations of the classical world in the light of selected ancient texts and Renaissance conceptions of Antiquity, with special attention to the depiction of politics and history. GE credit: ArtHum | AH, WC, WE.—Schein

**140. Thematic and Structural Study of Literature (4)**

Lecture/discussion—3 hours; term paper. Interpretation of selected works illustrating the historical evolution of themes, as well as of formal and structural elements. May be repeated for credit when substance of course varies. GE credit: ArtHum, Wrt | AH, WE.

**141. Introduction to Comparative Critical Theory (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: completion of entry level writing requirement. Introduction to comparative critical theory and its use for interpreting literary texts, film, and media forms in global culture. (Same course as Critical Theory 101.) GE credit: ArtHum, Wrt | AH, WC, WE.—S. (S.) Larsen

**142. Critical Reading and Analysis (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Close reading of selected texts; scrutiny of very limited amount of material, with attention to the problems of texts in translation. GE credit: ArtHum | AH, WC, WE.

**144. The Grotesque (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: completion of entry level writing requirement. Study of the “grotesque” in selected texts from the Renaissance to the 20th century, with attention to the “grotesque” as a means of social, cultural, and political commentary, as well as of aesthetic innovation. Offered in alternate years. GE credit: ArtHum, Wrt | AH, WC, WE.—S. (S.)

**145. Representations of the City (4)**

Lecture—2 hours; discussion—1 hour; writing. Exploration of the representation of the city in major translated literary texts from a variety of literary traditions and periods. Emphasis on the diversity of urban experience in literature. Topics include public and private space, memory, and gender. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Radwan, Sharlet

**146. Myth in Literature (4)**

Lecture—3 hours; term paper. Prerequisite: course 6 recommended. Comparative study of different versions of one or more central myths, with attention to their cultural settings, artistic and literary forms of representation, as well as to their psychological dimensions. GE credit: ArtHum, Wrt | AH, WC, WE.

**147. Modern Jewish Writers (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: completion of entry level writing requirement. Problems of the modern Jewish experience from the perspective of the writer’s construction of the self in relation to the future and to the non-Jew. Draws upon Russian, German, Yiddish, and American traditions. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

**148. Mystical Literatures of South Asia and the Middle East (4)**

Lecture/discussion—3 hours; term paper. Exploration of the comparative mystical literatures of major religious traditions, with a focus on those produced in South Asia and the Middle East, although including other traditions. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Venkatesan

**151. Colonial and Postcolonial Experience in Literature (4)**

Lecture—3 hours; term paper. Prerequisite: completion of entry level writing requirement. A literary introduction to the cultural issues of colonialism and postcolonialism through reading, discussing and writing on narratives which articulate diverse points of view. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Larsen

**152. Literature of the Americas (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: completion of entry level writing requirement. Study of the various stylistic, historical, social and cultural factors that contribute to a hemispheric vision of American literature, encompassing works by Canadian, United States, Caribbean, Brazilian, and Spanish-American writers. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

**152S. Literature of the Americas (Taught in Latin America) (4)**

Lecture/discussion—6 hours; term paper; field-work—6 hours. Prerequisite: completion of entry level writing requirement. Various stylistic, historical, social, and cultural factors that contribute to a hemispheric vision of American literature, encompassing works by Canadian, United States, Caribbean, Brazilian, and Spanish-American writers. Course taught abroad. May be repeated one time for credit. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.—Larsen

**153. The Forms of Asian Literature (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: completion of entry level writing requirement. Introduction to distinctive Asian literary forms, such as haiku, noh, the Chinese novel and tale, through reading of major works. Comparison with Western genres and study of native and Western critical traditions. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

**154. African Literature (4)**

Lecture—3 hours; term paper. Prerequisite: completion of Entry Level Writing Requirement (ELWR). Colonial and post-colonial sub-Saharan African literature and the African oral traditions from which it emerged. Genres and themes of African literature from the nineteenth century to the present. GE credit: ArtHum | AH, OL, WC, WE.—Adejumobi

**155. Classical Literatures of the Islamic World 600-1900 (4)**

Lecture—3 hours; term paper. Major texts from Arabic, Persian, Ottoman Turkish and Urdu literature with attention to historical and cross-cultural context. Includes epic, romance, various genres of lyric poetry, fairy tales, historical and religious stories, mystical and philosophical narratives, and essays. GE credit: ArtHum, Div, Wrt | AH, OL, WC, WE.—Sharlet

**156. The Ramayana (4)**

Lecture—3 hours; term paper. Exploration of the Indian epic, Ramayana, through the lens of literature, performance, and visual art. Emphasis on the text’s diversity and its contemporary global relevance. Topics include Ramayanas in Southeast Asia, and in various South Asian diaspora communities. (Same course as Religious Studies 158.) GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Venkatesan

**157. War and Peace in Literature (4)**

Lecture/discussion—3 hours; term papers. Prerequisite: course 1, 2, or 3, or consent of instructor. Through study of a few major works from Western and non-Western literature the course seeks to illuminate the way in which literature from antiquity to the present has dealt with the antinomy peace/war through the ages. GE credit: ArtHum, Wrt | AH, WC, WE.—Radwan

**158. The Detective Story as Literature (4)**

Lecture—3 hours; term paper. Study of the origins, literary and social background, development and implications of the literature of detection in a comparative context. GE credit: ArtHum, Wrt | AH, WC, WE.

**159. Women in Literature (4)**

Lecture—3 hours; term paper. Prerequisite: course 1, 2, 3, or 4 or the equivalent recommended. Portrayals of women in literature, comparing selected heroines who represent a particular theme, period, or genre. Texts range around the globe and from ancient to modern works, such as Lysistrata, Emma, Hedda Gabler, The Makioka Sisters, and Top Girls. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

**160A. The Modern Novel (4)**

Lecture/discussion—3 hours; term paper. The changing image of man and his world as seen in novels by such writers as Joyce, Proust, and Mann. GE credit: ArtHum, Wrt | AH, WC, WE.

**160B. The Modern Drama (4)**

Lecture/discussion—3 hours; term paper. Readings in representative authors such as Ibsen, Strindberg, Chekhov, Pirandello and Brecht. GE credit: ArtHum, Wrt | AH, WC, WE.—Finney

**161A. Tragedy (4)**

Lecture/discussion—3 hours; term paper. Persistent and changing aspects of the tragic vision in literature from ancient times to the present. GE credit: ArtHum, Wrt | AH, WC, WE.

**161B. Comedy (4)**

Lecture/discussion—3 hours; term paper. Comic attitudes towards life in literary works of different ages. GE credit: ArtHum, Wrt | AH, WC, WE.

**162. Writing Love and War in South Asia (4)**

Lecture—3 hours; term paper. Comparative study of the themes and motifs of love and war in the literature of South Asia. Includes a discussion of Sanskrit epics, classical erotic court poetry, medieval heroic poetry, mystical compositions and colonial and post-colonial fiction. GE credit: ArtHum | AH, WC, OL, WE.—Venkatesan

**163. Biography and Autobiography (4)**

Lecture/discussion—3 hours; term paper. Portrayals of a human life in biographies and/or autobiographies of different countries and ages. GE credit: ArtHum, Wrt | AH, WC, WE.

**164A. The European Middle Ages (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: completion of entry level writing requirement. Medieval literary genres as the foundation for modern literary forms. Topics and themes as love, God, vision, nature, history and politics, and sign theory. GE credit: ArtHum, Wrt | AH, WC, WE.—Schildgen

**164B. The Renaissance (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: completion of entry level writing requirement. Literature, new science, gender, politics, and exploration in European Renaissance. Readings in Petrarch, Machiavelli, Montaigne, Tasso, Ariosto, Stampa, Shakespeare, Labé and Aphra Behn. GE credit: ArtHum, Wrt | AH, WC, WE.—Schiesari

**164C. Baroque and Neoclassicism (4)**

Lecture/discussion—3 hours; term paper. Readings in major authors such as Calderón, Corneille, Pascal, Racine, Milton, and Grimmelshausen, with consideration of the tension between the expansive energies of the “baroque” and the restraints of dogma and reason. GE credit: ArtHum, Wrt | AH, WC, WE.

**164D. The Enlightenment (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: completion of entry level writing requirement. Enlightenment writers such as Swift, Voltaire, Sterne, Rousseau, Wollstonecraft, and Kant. Emphasis on the revolutionary impact of eighteenth-century philosophical ideas and literary forms on modern political, social, and aesthetic culture. GE credit: ArtHum, Wrt | AH, WC, WE.—Uhlig

**165. Caribbean Literatures (4)**

Lecture/discussion—4 hours. Prerequisite: completion of entry level writing requirement. Comparative approach to the multi-lingual, multi-cultural literatures of the Caribbean. Works from English, French, and Spanish speaking regions with special attention to problems of identity, diaspora and resistance, class, gender, race. Not open for credit to students who have completed course 165S. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

**165S. Caribbean Literatures (4)**

Lecture/discussion—4 hours. Prerequisite: upper division standing. Comparative approach to the multi-lingual, multi-cultural literatures of the Caribbean. Works from English, French, and Spanish speaking regions with special attention to problems of identity, diaspora and resistance, class, gender, race. Taught at the University of Havana, Cuba. Not open for credit to students who have completed course 165. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

**166. Literatures of the Modern Middle East (4)**

Lecture/discussion—3 hours; term paper. Major translated works in modern Middle Eastern and North African literature, including Arabic, Hebrew, Persian, and Turkish. Social and historical formation,

with topics such as conflict and coexistence, journeys, and displaced people, gender and family. GE credit: ArtHum, Wrt | AH, WC, WE. —Sharlet

#### **166A. The Epic (4)**

Lecture/discussion—3 hours; term paper. Study of various forms of epic poetry in both the oral and literary traditions. May be repeated for credit in different subject area. GE credit: ArtHum, Wrt | AH, WC, WE.

#### **166B. The Novel (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: completion of entry level writing requirement. The novel as global genre: picaresque, epistolary, Bildungsroman, historical novel, contemporary forms. May be repeated one time for credit. GE credit: ArtHum, Wrt | AH, WC, WE.

#### **167. Comparative Study of Major Authors (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Pivotal works of artists in the Western mainstream, such as Dante, Shakespeare, Cervantes, Goethe, Tolstoi, Proust, and Joyce. GE credit: ArtHum, Wrt | AH, WC, WE.

#### **168A. Romanticism (4)**

Discussion—3 hours; term paper. Prerequisite: completion of entry level writing requirement. Introduction to the Romantic movement with emphasis upon Romantic concepts of the self, irony, love, the imagination and artistic creativity, and the relationship of the individual to nature and society. GE credit: ArtHum, Wrt | AH, WC, WE. —Lokke

#### **168B. Realism and Naturalism (4)**

Discussion—3 hours; term paper. Prerequisite: consent of instructor. Novels and plays by Dickens, Zola, Flaubert, Dreiser, Ibsen, and Strindberg investigate marriage and adultery, the city and its perils, the hardships of industrialization, the war between the sexes, the New Woman, and other 19th-century themes. Offered in alternate years. GE credit: ArtHum, Wrt | AH, WC, WE. —Finney

#### **169. The Avant-Garde (4)**

Lecture/discussion—3 hours; term paper. Studies in movements such as surrealism, expressionism and the absurd. GE credit: ArtHum, Wrt | AH, WE.

#### **170. The Contemporary Novel (4)**

Lecture—3 hours; term paper. Study of important novels from different parts of the world, including Asia, Africa, Latin America, Europe, and the United States, in the period from the Second World War to the present. GE credit: ArtHum, Wrt | AH, WC, WE.

#### **172. A Story for a Life: The Arabian Nights (4)**

Lecture/discussion—3 hours; term paper. In-depth exploration of The Arabian Nights, the best-known work of pre-modern Arabic literature and a major work of world literature. Analysis of the work in its historical context and in comparison to other frame tales in world literature. (Same course as Arabic 140 and Middle East/South Asia Studies 121C.) Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, WC, WE. —Radwan, Sharlet

#### **175. Shahnameh: The Persian Book of Kings (4)**

Lecture/discussion—3 hours; term paper. In-depth analysis of the Persian Book of Kings (Shahnameh) by Abu al-Qasim Ferdowsi (d. 1020 CE) in its historical context with a comparative perspective on the role of this work in Persian and world literature. (Same course as Middle East/South Asian Studies 121A.) GE credit: ArtHum, Div, Wrt | AH, WC, WE. —Anooshahr, Sharlet

#### **180. Selected Topics in Comparative Literature (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement and at least one course in literature. Study of a selected topic or topics appropriate to student and faculty interests and areas of specialization of the instructor. May be repeated one time for credit when the topic differs. GE credit: ArtHum, Wrt | AH, WC, WE.

#### **180S. Selected Topics in Comparative Literature (Taught Abroad) (4)**

Lecture/discussion—6 hours; extensive writing; field-work—6 hours. Prerequisite: Subject A; at least one course in literature, or consent of instructor. Study of selected topics appropriate to student and faculty interests and areas of specialization of the instructor. May be repeated one time for credit when topic differs. Offered irregularly. GE credit: ArtHum, Wrt | AH, WC, WE. —Su.

#### **192. Internship in Comparative Literature (1-12)**

Internship—1-12 hours. Prerequisite: completion of 84 units; consent of instructor. Restricted to Comparative Literature majors. Internships in fields where students can practice their skills. May be repeated up to 12 units for credit. (P/NP grading only.)

#### **194H. Special Study for Honors Students (1-5)**

Independent study—1-5 hours. Prerequisite: open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member approved by the Program Director, leading to a senior honors thesis on a comparative topic. May be repeated for credit. (P/NP grading only.) GE credit: AH, WE.

#### **195. Seminar in Comparative Literature (4)**

Seminar—3 hours; term paper. Prerequisite: senior standing as a Comparative Literature major or minor or consent of instructor. Open only to Comparative Literature majors or minors or in consent of instructor. Advanced study of selected topics and texts in Comparative Literature, with explicit emphasis on the theoretical and interpretive approaches that define Comparative Literature as a discipline and distinguish it from other literary disciplines. Required for the major. GE credit: ArtHum | AH, WE.

#### **197T. Tutoring in Comparative Literature (1-5)**

Discussion—2-4 hours. Prerequisite: upper division standing with declared major in Comparative Literature. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with current courses offered by Comparative Literature. May be repeated for credit for a total of 6 units. (P/NP grading only.)

#### **198. Directed Group Study for Advanced Undergraduates (1-5)**

(P/NP grading only.)

#### **199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.)

#### **Graduate**

#### **210. Topics and Themes in Comparative Literature (4)**

Discussion—3 hours; term paper. Prerequisite: graduate standing in Comparative Literature, English, or a foreign-language literature, or consent of instructor. Comparative, interpretive study of the treatment of specific topics and themes in literary works from various periods, societies, and cultures, in light of these works' historical and sociocultural contexts. May be repeated for credit when topic differs.

#### **214. Approaches to Lyric Poetry (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Analysis and interpretation of poetic texts in different historical periods and national literatures, with consideration of major theoretical developments in the understanding of poetic discourse. Offered irregularly. —Schiesari

#### **215. Forms of the Spiritual Quest (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor; knowledge of at least one foreign language. An exploration, culminating in a research paper, of changing forms of the quest for transcendence in different cultures, mainly in major works of Western literature, but also in other traditions and from the perspectives of other disciplines. Offered irregularly.

#### **220. Literary Genres (4)**

Discussion—3 hours; term paper. Prerequisite: graduate standing in Comparative Literature, English, or a foreign-language literature, or consent of instructor. Comparative literature of major works in a particular genre from various linguistic, national, and cultural traditions, with particular attention to historical developments within the genre and to genre theory. May be repeated for credit when topic differs. Offered irregularly.

#### **238. Gender and Interpretation (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of how literary texts from different periods, societies, and cultures represent gender roles and gender hierarchy, building on recent work on gender in anthropology, literature, psychology, and women's studies. Offered irregularly.

#### **250A. Research in Primary Literature (4)**

Project. Individually guided research in the primary literature of concentration, under the supervision of a faculty member culminating in a conference paper. Required of M.A. and Ph.D. candidates.

#### **250B. Research in Second Literature (4)**

Project. Individually guided research in the second-year literature of concentration, under the supervision of a faculty member, culminating in a paper. Required of Ph.D. candidates.

#### **250C. Research in Third Literature or Special Topic (4)**

Conference—1 hour; term paper; independent study—8 hours. Individually guided research, under the supervision of a faculty member, in the third literature of concentration or on a special topic culminating in a paper. Required of Ph.D. candidates.

#### **250D. Dissertation Prospectus (4)**

Independent study. Individually guided writing of the dissertation prospectus under supervision of a faculty member. Must be taken prior to completion of the qualifying exam. Required of Ph.D. candidates. Offered irregularly. (S/U grading only.)

#### **255. Proseminar: Comparative Literature: Past, Present, Future (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing. Restricted to graduate students. History, theory, and methodology of comparative literature. Issues of national literature, world literature, and comparative literature. Relation of comparative literature to other disciplines and diverse expressions. Discussion of current problems in teaching and research in comparative literature. Required for MA/PhD.—F, S. (F, S.)

#### **260. Contexts of the 19th-Century Novel (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Development in 19th-century history, culture, and society in relation to major trends in the 19th-century novel. Offered irregularly.

#### **297. Directed Independent Study in Primary, Secondary, or Third Literature (4)**

Conference—1 hour; term paper; independent study—8 hours. Prerequisite: consent of instructor. Restricted to graduate students. Directed Independent Study in Primary, Secondary, or Third Literature culminating in term paper. Only for languages with no graduate course offerings. May be repeated for credit when no seminars are available and topic differs. —F, W, S. (F, W, S.)

#### **298. Directed Group Study (1-5)**

Prerequisite: graduate standing. (S/U grading only.)

#### **299. Individual Study (1-12)**

(S/U grading only.)

#### **299D. Special Study for the Doctoral Dissertation (1-12)**

(S/U grading only.)

## Professional

### 390. Teaching Comparative Literature in College (4)

Lecture—2 hours; discussion—2 hours. Prerequisite: appointment as a Comparative Literature Associate Instructor or consent of instructor. Restricted to graduate students. Discussion of the theory and practice of teaching composition at the college level in a department of comparative literature in relation to the major cultural and social developments and with specific application to the introductory courses 1, 2, 3, 4. (S/U grading only.)—F, W, S. (F, W, S.)

### 392. Teaching Internship in Comparative Literature (2)

Discussion—2 hours. Restricted to graduate students. Regular consultations between the student instructor teaching Comparative Literature courses and a supervisor. Specifically designed for first-time TAs in COM 5, 6, 7, and 10. Instruction in the teaching of writing in a literature course, grading of papers, leading discussions. (S/U grading only.)—F, W, S. (F, W, S.)

### 396. Teaching Assistant Training Practicum (1-4)

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## Computer Science

**See Computer Science, on page 230; Computer Science (A Graduate Group), on page 230; Engineering: Computer Science, on page 288; and Engineering: Electrical and Computer Engineering, on page 295.**

## Computer Science

(College of Letters and Science)

Nina Amenta, Ph.D., Chairperson of the Department

**Department Office.** 2063 Kemper Hall  
530-752-7004; <http://www.cs.ucdavis.edu>

**Faculty.** For complete faculty listing, please see Engineering: Computer Science, on page 288.

### The Major Program

The Department of Computer Science administers two majors: Computer Science and Engineering (CSE), in the College of Engineering, and Computer Science (CS), in the College of Letters and Science. It also administers two minors: Computer Science, in the College of Letters and Science, and Computational Biology, in the College of Engineering. For information on the Computer Science and Engineering curriculum and the minor in Computational Biology, see Engineering: Computer Science, on page 288.

The primary differences between the CSE and CS majors are the extent of hardware coverage and curricular flexibility. The CSE major develops a solid understanding of the entire machine, including hands-on experience with its hardware components. The CS major teaches some hardware, at the digital design level, on simulators. The CSE major has fewer free electives. The CS major's more generous electives make it easier to complete a minor or double major.

Students in the CS major receive a solid grounding in the fundamentals of computer languages, operating systems, computer architecture, and the mathematical abstractions underpinning computer science. Students are prepared for both industry and post-graduate study.

### B.S. Major Requirements:

	UNITS
<b>Preparatory Subject Matter .....</b>	<b>50-55</b>
Mathematics 21A-21B-21C; 22A or 67.....	15-16
Computer Science Engineering 20, 30, 40, 60.....	16
Computer Science Engineering 50 or Electrical and Computer Engineering 70 ... 4 One series from the following four.....	15-19
(a) Chemistry 2A-2B-2C	
(b) Chemistry 2A-2B and Biological Sciences 2A	
(c) Chemistry 2AH-2BH-2CH	
(d) Physics 9A-9B-9C and Mathematics 21D	
<b>Depth Subject Matter .....</b>	<b>51-54</b>
Computer Science Engineering 122A, 120 or 122B, 140A, 150, 154A .....	20
Computer Science Engineering 132 or Mathematics 135A or Statistics 131A .... 4	
Computer Science electives .....	27-30
Minimum of 7 courses, including at least one mathematics or statistics course, from: Computer Science Engineering courses numbered between 120 and 189 inclusive; Computer Science and Engineering 193AB (counts as one); one approved course of 3 or 4 units from Computer Science and Engineering 192 or 199; Electrical and Computer Engineering 171, 172, 180A, 180B; Linguistics 177; Mathematics courses numbered between 100 and 189, excluding Mathematics 111; Statistics 131A, 131B. <b>No course can count as both a required course and a Computer Science elective.</b>	

### Total Units for the Major ..... 101-109

**Major Advisers.** M. Farrens, V. Filkov, D. Ghosal, P. Koehl, N. Matloff, M. Neff, P. Koehl, P. Rogaway

### Minor Program Requirements:

	UNITS
<b>Computer Science.....</b>	<b>24</b>

Computer Science Engineering 60 ..... 4  
Upper division Computer Science Engineering courses ..... 20 |

Select any upper-division Computer Science Engineering courses. A single approved course of 3 or 4 units from Computer Science and Engineering 192 or 199 is allowed.

Note. Computer Science Engineering 60 has a prerequisite chain of 20, 30, 40 and Mathematics 16A or 21A.

**Note.** The minor program has prerequisites of Computer Science Engineering 20, 30, and 40, and Mathematics 16A or 21A.

**Graduate Study.** See *Graduate Studies*, on page 120.

## Computer Science (A Graduate Group)

Kwan-Liu Ma, Ph.D., Chairperson of the Group

**Group Office.** 2063 Engineering II (Department of Computer Science)  
530-752-7004; [gradinfocs@ucdavis.edu](mailto:gradinfocs@ucdavis.edu); <http://www.cs.ucdavis.edu>

### Faculty

Venkatesh Akella, Ph.D., Professor (*Electrical and Computer Engineering*)  
Nina Amenta, Ph.D., Professor, Chair (*Computer Science*)  
Zhaojun Bai, Ph.D., Professor (*Computer Science*)  
Matthew Bishop, Ph.D., Professor (*Computer Science*)  
Hemant Bhargava, Ph.D., Professor (*Graduate School of Management*)

Hao Chen, Ph.D., Associate Professor (*Computer Science*)

Harry Cheng, Ph.D., Professor (*Mechanical and Aerospace Engineering*)

R. Holland Cheng, Ph.D., Professor (*Molecular and Cellular Biology*)

Chen-Nee Chuah, Ph.D., Assistant Professor (*Electrical and Computer Engineering*)

James P. Crutchfield, Ph.D., Professor (*Physics*)  
Ian Davidson, Ph.D., Professor (*Computer Science*)

Jesus M. D'Souza, Ph.D., Professor (*Mechanical and Aerospace Engineering*)

Raissa M. D'Souza, Ph.D., Assistant Professor (*Mechanical and Aerospace Engineering*)

Jesu DeLoera, Ph.D., Professor (*Mathematics*)

Prem Devanbu, Ph.D., Professor (*Computer Science*)

Matthew Farrells, Ph.D., Professor (*Computer Science*)

Robert Faris, Ph.D., Associate Professor (*Sociology*)  
Vladimir Filkov, Ph.D., Associate Professor (*Computer Science*)

Matthew Franklin, Ph.D., Professor (*Computer Science*)

Dipak Ghosal, Ph.D., Professor (*Computer Science*)

Todd J. Green, Ph.D., Assistant Professor (*Computer Science*)

Daniel Gusfield, Ph.D., Professor (*Computer Science*)

Francois Gygi, Ph.D., Professor (*Computer Science*)

Bernd Hamann, Ph.D., Professor (*Computer Science*)

Michael Hogarth, Ph.D., Professor (*School of Medicine*)

Greta Hsu, Ph.D., Associate Professor (*Graduate School of Management*)

Sanjay Joshi, Ph.D., Associate Professor (*Mechanical and Aerospace Engineering*)

Louise Kellogg, Ph.D., Professor (*Geology*)

Patrice Koehl, Ph.D., Professor (*Computer Science*)

Mathias Koeppe, Ph.D., Professor (*Mathematics*)

Karl Levitt, Ph.D., Professor (*Computer Science*)

Xin Liu, Ph.D., Associate Professor (*Computer Science*)

Kwan-Liu Ma, Ph.D., Professor (*Computer Science*)

Norman Matloff, Ph.D., Professor (*Computer Science*)

Nelson Max, Ph.D., Professor (*Computer Science*)

Deb Niemeier, Ph.D., Professor (*Civil and Environmental Engineering*)

Prasant Mohapatra, Ph.D., Professor (*Computer Science*)

Biswanath Mukherjee, Ph.D., Professor (*Computer Science*) *Distinguished Graduate Mentoring Award*

Michael Neff, Ph.D., Associate Professor (*Computer Science*)

Ronald Olsson, Ph.D., Professor (*Computer Science*)

John Owens, Ph.D., Assistant Professor (*Electrical and Computer Engineering*)

Raju Pandey, Ph.D., Associate Professor (*Computer Science*)

Sean Peisert, Ph.D., Assistant Adjunct Professor (*Computer Science*)

Bahram Ravani, Ph.D., Professor (*Mechanical and Aerospace Engineering*)

Robert Redinbo, Ph.D., Professor (*Electrical and Computer Engineering*)

David Rocke, Ph.D., Professor (*Applied Science*)

Garry Rodrigue, Ph.D., Professor (*Applied Science*)

Phillip Rogaway, Ph.D., Professor (*Computer Science*)

Kenneth Shackel, Ph.D., Professor (*Plant Sciences*)

David Slaughter, Ph.D., Professor (*Biological and Agricultural Engineering*)

Zhendong Su, Ph.D., Associate Professor (*Computer Science*)

Ilias Tagkopoulos, Ph.D., Associate Professor (*Computer Science*)

Susan Ustin, Ph.D., Professor (*Land, Air and Water Resources*)

S. Felix Wu, Ph.D., Professor (*Computer Science*)

Rao Vemuri, Ph.D., Professor (*Applied Science*)

Kent Wilken, Ph.D., Professor  
(*Electrical and Computer Engineering*)  
David Woodruff, Ph.D., Professor  
(*Graduate School of Management*)  
Catherine Yang, Ph.D., Associate Professor  
(*Graduate School of Management*)  
Ben Yoo, Ph.D., Professor  
(*Electrical and Computer Engineering*)

### Emeriti Faculty

Ralph Algazzi, Ph.D., Professor Emeritus  
Kenneth Joy, Ph.D., Professor Emeritus  
Peter Linz, Ph.D., Professor Emeritus  
Charles Martel, Ph.D., Professor Emeritus  
E.O. Milton, Ph.D., Professor Emeritus  
Raju Pandey, Ph.D., Associate Professor Emeritus  
Michael Soderstrand, Ph.D., Professor Emeritus  
Donald Topkis, Ph.D., Professor Emeritus  
Richard Walters, Ph.D., Professor Emeritus

### Affiliated Faculty

Sean Peisert, Ph.D., Adjunct Associate Professor  
(*Computer Science*)

**Graduate Study.** The Graduate Group in Computer Science offers programs of study leading to the M.S. and Ph.D. degrees in Computer Science. The varied nature of the faculty brings a wide variety of research interests to the program. Research strengths lie in algorithms, computational biology, computer architecture, computer graphics and visualization, database systems, computer security and cryptography, computer networks, program specifications and verification, programming languages and compilers, parallel and distributed systems, scientific computation, and software engineering. Interdisciplinary research in computer science is encouraged.

**Preparation.** Normal preparation for the program is a bachelor's degree in either computer science or in a closely related field (such as electrical engineering or mathematics, with substantial course work in computer science). Applications are also considered from students with outstanding records in other disciplines. M.S. students may either complete a thesis or pass a comprehensive examination. Ph.D. students must pass a qualifying oral examination and complete a dissertation demonstrating original research in an area approved by the Graduate Group.

**Graduate Advisers.** P. Devanbu, M. Farrens, D. Ghosal, V. Filkov, P. Rogaway

## Conservation Biology

See **Ecology (A Graduate Group), on page 250; and Wildlife, Fish, and Conservation Biology, on page 587.**

## Consumer Science

(College of Agricultural and Environmental Sciences)

**Faculty.** See under the Division of *Textiles and Clothing*, on page 567.

**Major Programs.** The Consumer Food Science option under the Food Science major is a related program. See also *Food Science and Technology*, on page 340, *Nutrition*, on page 490, and *Textiles and Clothing*, on page 567.

**Graduate Study.** For graduate study, see *Graduate Studies*, on page 120.

### Courses in Consumer Science (CNS)

Questions pertaining to the following courses should be directed to the Division of Textiles and Clothing Advising office in 1204 RMI south or 129 Everson Hall.

### Lower Division

#### 92. Internship in Consumer Science (1-12)

Internship—3-36 hours. Prerequisite: consent of instructor. Internship on and off campus in a consumer science related area. (P/NP grading only.)

### Upper Division

#### 100. Consumer Behavior (3)

Lecture—3 hours. Prerequisite: preparation in areas of psychology or sociology and economics recommended. Provides a set of behavioral concepts and theories useful in understanding consumer behavior on the part of the individual, business, and social organizations. Conceptual models to help guide and understand consumer research will be presented. GE credit: SocSci, Div, Wrt | SS, WE.

#### 192. Internship in Consumer Science (1-12)

Internship—3-36 hours. Prerequisite: completion of a minimum of 84 units; consent of instructor. Internship on and off campus in a consumer science related area. (P/NP grading only.)

#### 198. Directed Group Study (1-5)

(P/NP grading only.)

#### 199. Special Study for Advanced Undergraduates (1-5)

(P/NP grading only.)

### Graduate

#### 299. Research (1-12)

(S/U grading only.)

### Professional

#### 396. Teaching Assistant Training Practicum (1-4)

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## Contemporary Leadership

(College of Agricultural and Environmental Sciences)

The Science and Society Program offers a minor in Contemporary Leadership, open to all undergraduate students regardless of major. The minor provides a broad overview of leadership theory and practice, and engages students in critical thinking, self-reflection, problem solving and multicultural education. Students should contact the minor adviser for course selection and plan approval.

Consult advisers often to insure timely enrollment in Science and Society 192 and 190X as courses with fewer than ten students will not be taught.

### Minor Program Requirements:

	UNITS
--	-------

#### Contemporary Leadership ..... 24

##### Core Leadership Courses

Science and Society 130 .....	4
Science and Society 192 (must be taken concurrently with an approved internship) .....	2
Science and Society 190X.....	2

##### Preparatory Subject Matter

Students are required to complete four units from each of the following four categories. All courses are four units unless specified in parentheses:

<i>Ethics and Values:</i> Animal Science 170, Computer Science 188 (3), English 107, Environmental Science and Policy 164 (3), Nature and Culture 120, Philosophy 115, 116, 117, Psychology 175 .....	4
<i>Communication, Interpersonal Relationships and Human Dynamics:</i> Anthropology 139AN, Communication 134, 135, 136, Community and Regional Development 172, 174, Linguistics 163, Psychology 151, Sociology 126, 132, University Writing Program 104 (A-F) .....	4

### Organization Structure and Cultures:

American Studies 125, Anthropology 105, 123BN, Community and Regional Development 152, 154, 158, 164, Sociology 30A (3), 156, 180A, 180B, 183, Women's Studies 140.....	4
<i>Multiculturalism, the Global Community and Social Change:</i> American Studies 133, 153, 156, Community and Regional Development 176, English 179, History 173, 178A, 178B, Native American Studies 134, Political Science 124, 125, 130, Textiles and Clothing 174.....	4

**Minor Adviser.** The list of appropriate courses changes over time. Consult Elvira Galvan Hack in Science and Society (*Plant Pathology*) to request an advising appointment at [eghack@ucdavis.edu](mailto:eghack@ucdavis.edu).

## Critical Theory

Jeff Fort, Ph.D., Chairperson of the Program

**Program Office.** 216 Sproul Hall  
530-752-5799; <http://crittheory.ucdavis.edu>

### Committee in Charge

Jeff Fort, Ph.D. (*French*)

Kathleen Frederickson, Ph.D. (*English*)

Neil Larsen, Ph.D. (*Comparative Literature*)

Kriss Ravetto-Biagioli, Ph.D.

    (*Cinema and Technocultural Studies*)

Sven-Erik Rose, Ph.D. (*German*)

Scott Shershaw, Ph.D. (*English*)

David Simpson, Ph.D. (*English*)

**Graduate Study.** The program in Critical Theory offers study and research leading to the Ph.D. with a designated emphasis in Critical Theory. The program provides theoretical emphasis and interdisciplinary perspective to students already preparing for the Ph.D. in one of 14 participating graduate programs (Anthropology, Comparative Literature, Cultural Studies, Education, English, French, German, History, Music, Psychology, Sociology, Spanish, Study of Religion, and Performance Studies). Students complete all requirements for the Ph.D., including the dissertation, in one of the participating departments. Minimum coursework for the Critical Theory Designated Emphasis consists of four courses. The first three of these, Critical Theory 200A, 200B, and 200C are taught by affiliated faculty, with 200A normally being taken first. For the fourth course, students have the option of taking another section of Critical Theory 200B or an approved course from any affiliated department.

**Graduate Adviser.** Consult Critical Theory Program office.

### Courses in Critical Theory (CRI)

#### Upper Division

##### 101. Introduction to Critical Theoretical Approaches to Literature and Culture (4)

Lecture/discussion—3 hours; term paper. Prerequisite: completion of entry level writing requirement. Introduction to critical theory and its use for interpreting literary texts, film, and media forms in our present global culture. (Same course as Comparative Literature 141.) GE credit: ArtHum, Wrt | AH, WC, WE.—S. (S.)

#### Graduate

##### 200A. Approaches to Critical Theory (4)

Seminar—3 hours; term paper. Prerequisite: graduate standing in a participating program. Restricted to Graduate students. Critical overview of modern theoretical texts; e.g., semiotics, hermeneutics, deconstruction, social and cultural critique, feminist theory, psychoanalysis.—F, W, S. (F, W, S.)

##### 200B. Problems in Critical Theory (4)

Seminar—3 hours; term paper. Prerequisite: graduate student standing. Restricted to Graduate students. Focused study of a particular critical theoretical approach, school or perspective. Topics

may include but are not limited to: critical approaches to the study of literature, culture, film, historiography, visual culture, the body, and aesthetics. May be repeated for credit when topic differs and with consent of instructor. —F, W, S. (F, W, S.)

#### **200C. History of Critical Theory (4)**

Seminar—3 hours; term paper. Prerequisite: graduate student standing. Restricted to Graduate students. Critical analysis and discussion of pre-twentieth century theories of literary and cultural criticism. Topics may include but are not limited to: ancient and early modern philosophy; nature and culture in the Renaissance; theories of Mimesis from antiquity to the Renaissance. May be repeated for credit when topic differs and with consent of instructor. —F, W, S. (F, W, S.)

#### **201. Critical Theory Special Topics (4)**

Seminar—3 hours; term paper. Prerequisite: graduate student standing. Application of theoretical principles to one specific research topic. May be repeated for credit with consent of instructor when topic differs. —F, W, S. (F, W, S.)

#### **202. Visual Culture (4)**

Lecture/discussion—4 hours. Restricted to Graduate student standing. Analysis of image production in the contemporary world (photography, film, television, advertising, etc.) and their effects on individual subjectivities and collective social identities. Offered irregularly. —W. (W.)

#### **298. Directed Group Study (1-5)**

Prerequisite: consent of instructor. Restricted to Graduate student standing. —F, W, S. (F, W, S.)

#### **299. Individual Study (1-12)**

Prerequisite: graduate student standing. (S/U grading only.) —F, W, S. (F, W, S.)

## Crop Science and Management

(College of Agricultural and Environmental Sciences)

This major was discontinued as of Fall 2008; see *Plant Sciences*, on page 514.

## Cultural Studies (A Graduate Group)

Robert Irwin, Ph.D., Director of the Group

**Group Office.** 3102 Hart Hall  
530-752-2069; <http://culturalstudies.ucdavis.edu>

#### **Committee in Charge**

Marisol de la Cadena, Ph.D. (*Anthropology*)  
Maxine Craig, Ph.D. (*Gender, Sexuality, and Women's Studies*)

Omnia el Shakry, Ph.D. (*History*)

Kathleen Frederickson, Ph.D. (*English*)

Robert M. Irwin, Ph.D. (*Spanish and Portuguese*)

Caren Kaplan, Ph.D. (*American Studies, Science and Technology Studies*)

Susette Min, Ph.D. (*Asian American Studies, Art History*)

Kriss Ravello, Ph.D. (*Technocultural Studies*)

Robyn Rodriguez, Ph.D. (*Asian American Studies*)

Sudipta Sen, Ph.D. (*History*)

Elisa White, Ph.D. (*African American and African Studies*)

#### **Affiliated Faculty**

Moradewun Adejunmobi, Ph.D., Professor (*African American and African Studies*)

Ali Abooshaahr, Associate Professor (*History*)  
Mario Biagioli, Ph.D., Professor

(*School of Law; Science and Technology Studies*)

Charlotte Biltzoff, Ph.D., Assistant Professor (*American Studies, Food Science and Technology*)

Lawrence Bogad, Ph.D., Associate Professor (*Theatre and Dance*)

Ryan Cartwright, Assistant Professor (*American Studies*)

Angie Chabram, Ph.D., Professor (*Chicana/o Studies*)

Christina Cogdell, Ph.D., Associate Professor (*Design*)

Elizabeth Constable, Ph.D., Associate Professor (*Women and Gender Studies*)

Allison Coudert, Ph.D., Professor (*Religious Studies*)

Xiaomei Chen, Ph.D., Professor (*East Asian Languages and Cultures*)

Maxine Craig, Ph.D., Associate Professor (*Women and Gender Studies*)

Diana K. Davis, Ph.D., Associate Professor (*History*)

Marisol de la Cadeña, Ph.D., Associate Professor (*Anthropology, Science and Technology Studies*)

Sergio de la Mora, Ph.D., Associate Professor (*Chicana/o Studies*)

David de la Pena, Assistant Professor (*Environmental Design*)

Gregory Dobbins, Ph.D., Associate Professor (*English*)

Joseph Dumit, Ph.D., Associate Professor (*Anthropology, Science and Technology Studies*)

Tarek Elhaik, Assistant Professor (*Anthropology*)

Omnia El Shakry, Ph.D., Associate Professor (*History*)

Kriss Fallon, Assistant Professor (*Cinema and Digital Media*)

Gail Finney, Ph.D., Professor

(*Comparative Literature, German and Russian*)

Jaimey Fisher, Ph.D., Associate Professor (*Cinema and Technocultural Studies, German and Russian*)

Kathleen Frederickson, Ph.D., Assistant Professor (*English*)

Elizabeth Freeman, Ph.D., Professor (*English*)

Cristiana Giordano, Ph.D., Assistant Professor (*Anthropology*)

Laura Grindstaff, Ph.D., Professor (*Sociology*)

James Griesemer, Ph.D., Professor

(*Philosophy, Science and Technology Studies*)

Angela Harris, J.D., Professor (*School of Law*)

Danielle Heard, Ph.D., Assistant Professor (*English*)

Wendy Ho, Ph.D., Associate Professor (*Asian American Studies, Women and Gender Studies*)

Hsuan Hsu, Ph.D., Associate Professor (*English*)

Lynette Hunter, Ph.D., Professor (*Theatre and Dance*)

Robert Irwin, Ph.D., Professor

(*Spanish and Portuguese*)

Carlos Jackson, Ph.D., Assistant Professor (*Chicana/o Studies*)

Rana Jaleel, Assistant Professor

(*Gender, Sexuality and Women's Studies*)

Mark Jernig, Ph.D., Associate Professor (*English*)

Suad Joseph, Ph.D., Professor

(*Anthropology, Women and Gender Studies*)

Susan Kaiser, Ph.D., Professor (*Textiles and Clothing, Women and Gender Studies*)

Caren Kaplan, Ph.D., Professor (*American Studies, Science and Technology Studies*)

Richard Kim, Ph.D., Associate Professor (*Asian American Studies*)

Elisabeth Krimmer, Ph.D., Professor (*German and Russian*)

Patrick LaMieux, Assistant Professor (*Cinema and Digital Media*)

Neil Larsen, Ph.D., Professor

(*Comparative Literature, Critical Theory*)

Michael Lazzara, Ph.D., Associate Professor (*Spanish and Portuguese*)

Tim Lenoir, Professor (*Cinema and Digital Media*)

Sheldon Lu, Ph.D., Professor (*Comparative Literature*)

Suncaina Maira, Ph.D., Professor

(*Asian American Studies*)

Amina Mama, Ph.D., Professor

(*Women and Gender Studies*)

Desirée Martín, Ph.D., Assistant Professor (*English*)

Colin Milburn, Ph.D., Associate Professor (*English*)

Flagg Miller, Professor (*Religious Studies*)

Susette Min, Ph.D., Associate Professor

(*Asian American Studies*)

Fiamma Montezemolo, Associate Professor (*Cinema and Digital Media*)

Maceo Montoya, Assistant Professor

(*Chicana/o Studies*)

Bettina Ng'wenyo, Ph.D., Associate Professor (*African American and African Studies*)

Halifa Osumare, Ph.D., Associate Professor (*African American and African Studies*)

Ana Peluffo, Ph.D., Associate Professor (*Spanish and Portuguese*)

Sarah Perrault, Ph.D., Assistant Professor (*University Writing Program*)

Jessica Bissett Perea, Assistant Professor (*Native American Studies*)

Carolyn Thomas, Ph.D., Professor (*American Studies*)

Vaidehi Ramanathan, Ph.D., Professor (*Linguistics*)  
Kriss Ravello-Biagioli, Ph.D., Associate Professor (*Cinema and Technocultural Studies*)

Michael Rios, Ph.D., Associate Professor (*Environmental Design*)

Robyn Rodriguez, Ph.D., Associate Professor (*Asian American Studies*)

Clarissa Rojas, Assistant Professor (*Chicana/o Studies*)

Jon Rossini, Ph.D., Associate Professor (*Theatre and Dance*)

Parama Roy, Ph.D., Associate Professor (*English*)  
Margaret Rucker, Ph.D., Professor (*Textiles and Clothing*)

Simon Sadler, Ph.D., Professor (*Design*)

Suzana Sawyer, Ph.D., Associate Professor (*Anthropology*)

Sudipta Sen, Ph.D., Professor (*History*)

Scott Simon, Ph.D., Professor (*English*)

Julia Simon, Ph.D., Professor (*French and Italian*)

Eric Smoodin, Ph.D., Professor (*American Studies*)  
Maurice Stierl, Assistant Professor (*Cultural Studies*)

Madhavi Sunder, J.D., Professor (*School of Law, Science and Technology Studies*)

Julie Sze, Ph.D., Associate Professor (*American Studies*)

Grace Wang, Ph.D., Assistant Professor (*American Studies*)

Heghnar Watenpaugh, Ph.D., Associate Professor (*Art History*)

Keith Watenpaugh, Ph.D., Associate Professor (*Religious Studies*)

Evan Watkins, Ph.D., Professor (*English*)

Karen Watson-Gegeo, Ph.D., Professor (*Education*)

Elisa White, Associate Professor, African (*American and African Studies*)

Carl Whithaus, Ph.D., Associate Professor (*University Writing Program*)

Diane Wolf, Ph.D., Professor (*Sociology, Jewish Studies*)

Julie Wyman, Ph.D., Assistant Professor (*Cinema and Technocultural Studies*)

Susy J Zepeda, Assistant Professor (*Chicana/o Studies*)

Chunjie Zhang, Assistant Professor (*German and Russian*)

Li Zhang, Ph.D., Professor (*Anthropology*)

Michael Ziser, Ph.D., Associate Professor (*English*)

**Graduate Study.** The Graduate Group in Cultural Studies at UC Davis offers an interdisciplinary approach to the study of culture and society that highlights how sexuality, race, ability, citizenship, gender, nationality, class and language organize embodied identities, social relations and cultural objects. With the close guidance and supervision of a faculty committee, students in the program pursue interdisciplinary research in areas including studies of comparative and critical race, ecocriticism, fashion, queer theory, media and popular cultural representation, science and technology, Marxist theory, travel and tourism, food, physical and cognitive abilities, cultural geography, transnational culture and politics, globalization, religion, rhetoric, performance, and critical theory. Although both the Ph.D. and M.A. are offered, the majority of students are admitted to the Ph.D. program.

**Preparation.** Normal preparation for the program is a bachelor's degree in a related field. M.A. students must pass an examination. Ph.D. students must pass a qualifying examination, a comprehensive examination, and complete a dissertation demonstrating original research in an area approved by

the Graduate Group. In addition to the standard UC Davis graduate application (which requires a statement of purpose), we also require three letters of recommendation, transcripts, GRE scores, writing sample (ten-page minimum, not exceeding twenty pages), and a fellowship application.

**Graduate Advisers.** Omnia el Shakry (*History*), Caren Kaplan (*American Studies*), Kriss Ravetto (*Cinema and Technocultural Studies*), Robert M. Irwin (*Spanish and Portuguese*), Sudipta Sen (*History*)

### Courses in Cultural Studies (CST)

#### Graduate

##### 200A. Histories of Cultural Studies (4)

Lecture/discussion—4 hours. Prerequisite: graduate standing or consent of instructor. Undergraduate coursework in the humanities or social sciences recommended. Histories and traditions of cultural studies internationally; multiple legacies of cultural studies as a field of inquiry in various geographical contexts; foregrounds important critical perspectives resulting from social and intellectual movements worldwide.—F. (F.)

##### 200B. Theories of Cultural Studies (4)

Lecture/discussion—4 hours. Prerequisite: course 200A or consent of instructor. Definitions of “critical” scholarship and examination of various contexts in which cultural studies theory has emerged worldwide. Both mainstream and alternative theoretical traditions, such as those developed by people of color and by other minoritized groups.—W. (W.)

##### 200C. Practices of Cultural Studies (4)

Lecture/discussion—4 hours. Prerequisite: courses 200A and 200B or consent of instructor. Methodological and practical applications of cultural studies research. Critical analyses of ethnography, textual analysis, social change, community development, and identity formation. Emphasis given to students’ unique versions of cultural studies practices.—S. (S.)

##### 204. History and Theory of Sexualities (4)

Lecture/discussion—4 hours. Prerequisite: course 200A (may be taken concurrently) or consent of instructor. Studies of sexuality in feminist, literary, historical, and cultural studies research, specifically examining the emergence of “sexuality” as a field of research and the relationship of sexuality studies to cultural forms, subjectivity, and social relations generally. May be repeated two times for credit. Offered irregularly.—F. (F.)

##### 206. Studies in Race Theory (4)

Lecture/discussion—4 hours. Prerequisite: course 200A (may be taken concurrently) or consent of instructor. Theoretical framework for the critical study of race, drawing on contemporary cultural studies and postcolonial scholarship in order to understand the social production of “race” as a category for organizing social groups and determining group processes. Offered irregularly.—W. (W.)

##### 208. Studies in Nationalism, Transnationalism, and Late Capitalism (4)

Lecture/discussion—4 hours. Prerequisite: course 200A (may be taken concurrently) or consent of instructor. Contemporary theories of nation, nationalism, postcolonialism, and transnationalism. Specific attention to the relationship between cultural production and the formation of ideas about nation and nationalism, including examination of both “legitimizing” and resistant discourses. Offered irregularly.—S. (S.)

##### 210. Memory, Culture, and Human Rights (4)

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Restricted to graduate students. Explores the multiple convergences among memory, culture, and human rights. Discusses diverse approaches to how societal actors in different historical, cultural, and national settings, construct meanings of past political violence, inter-group conflicts, and human rights struggles. (Same course as Human Rights 200B.) Offered in alternate years.—F. Lazzara

### 212. Studies in the Rhetorics of Culture (4)

Lecture/discussion—4 hours. Prerequisite: course 200A (may be taken concurrently) or consent of instructor. Survey of critical and analytical approaches to the study of texts. Examination of multi-mediated objects to understand their cultural import by focusing on discursive production, dispersal, and reception processes, and related shifts in power relations. Offered irregularly.—F. (F.)

##### 214. Studies in Political and Cultural Representations (4)

Lecture/discussion—4 hours. Prerequisite: course 200A (may be taken concurrently) and consent of graduate adviser. Framework for the analysis of political and popular cultural representations. Emphasis on concepts, theories, and methodologies illuminating dominant and vernacular cultural representation, appropriation, and innovation in transnational contexts. May be repeated for credit up to 4 times when topic differs. Offered irregularly.—W. (W.)

##### 250. Research Seminar (4)

Seminar—4 hours. Prerequisite: courses 200A, 200B, 200C or consent of instructor. Designed to facilitate student interaction and promote student research by guiding students through the production of a publishable essay. Essays submitted, distributed, and discussed by seminar participants. May be repeated up to 12 units of credit.—W. (W.)

##### 270A. Individually Guided Research in Cultural Studies (4)

Discussion—1 hour; independent study—2 hours; extensive writing. Prerequisite: course 200C, 250, consent of instructor. Individually guided research, under the supervision of a faculty member, on a Cultural Studies topic related to the student’s proposed dissertation project to produce a dissertation prospectus.—F, W, S. (F, W, S.)

##### 270B. Individually Guided Research in Cultural Studies (4)

Discussion—1 hour; independent study—2 hours; extensive writing. Prerequisite: course 200C, 250, consent of instructor. Individually guided research, under the supervision of a faculty member, on a Cultural Studies topic related to the student’s proposed dissertation project to produce a dissertation prospectus.—F, W, S. (F, W, S.)

##### 270C. Individually Guided Research in Cultural Studies (4)

Discussion—1 hour; independent study—2 hours; extensive writing. Prerequisite: course 200C, 250, consent of instructor. Individually guided research, under the supervision of a faculty member, on a Cultural Studies topic related to the student’s proposed dissertation project to produce a dissertation prospectus.—F, W, S. (F, W, S.)

##### 290. Colloquium (1)

Lecture—1 hour. Prerequisite: graduate standing or consent of instructor. Designed to provide cohort identity and faculty student exchange. Opportunity to present papers, hear guest lecturers, and see faculty presentations, gather for organizational and administrative news, exchange information, and make announcements. May be repeated up to 12 units of credit. (S/U grading only.)—F, W, S. (F, W, S.)

##### 295. Special Topics (4)

Lecture/discussion—4 hours. Prerequisite: graduate standing or consent of instructor. Special topics courses offered according to faculty and student interests and demands. May be repeated for credit with consent of adviser.—F, W, S. (F, W, S.)

##### 298. Group Research (1-5)

(S/U grading only.)—F, W, S. (F, W, S.)

##### 299. Directed Research (1-5)

(S/U grading only.)—F, W, S. (F, W, S.)

##### 299D. Dissertation Research (1-12)

Independent study—3-36 hours. Prerequisite: advancement to doctoral candidacy. (S/U grading only.)—F, W, S. (F, W, S.)

### Professional

#### 396. Teaching Assistant Training Practicum (1-4)

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

### Dermatology

See **Medicine, School of, on page 427.**

### Design

(College of Letters and Science)

Susan Avila, M.F.A., Chairperson of the Department

**Department Office.** 101 Art Building  
530-752-0890; <http://design.ucdavis.edu>

#### Faculty

Susan Avila, M.F.A., Professor  
Christina Cogdell, Ph.D., Associate Professor  
Glenda Drew, M.A., Professor  
James Housefield, Ph.D., Associate Professor  
Mark Kessler, M.Arch., Associate Professor  
Helen Koo, Ph.D., Assistant Professor  
Timothy McNeil, M.A., Professor  
Konstantinos Papamichael, Ph.D., Professor  
Simon Sadler, Ph.D., Professor  
Michael Siminovitch, Ph.D., Professor  
Brett Snyder, M.Arch., Assistant Professor  
Susan Verba, M.F.A., Associate Professor  
Jaiyi Young, M.F.A., Assistant Professor

#### Emeriti Faculty

Richard Berteaux, B.Arch., M.S., Professor Emeritus  
Frances Butler, M.A., Professor Emerita  
Dolph Gotelli, M.A., Professor Emeritus  
Patricia Harrison, M.Arch., Professor Emerita  
Gyongy Laky, M.A., Professor Emerita  
Helge B. Olsen, Senior Lecturer Emeritus  
Victoria Z. Rivers, M.A.C.T., S.C.T., Professor Emerita  
Katherine W. Rossbach, M.A., Professor Emerita  
Ann Savageau, M.F.A., Professor Emerita  
Barbara Shawcroft, M.F.A., Professor Emerita  
JoAnn C. Stabb, M.A., Senior Lecturer Emerita  
Kathryn Sylva, M.F.A., Professor Emerita

#### Affiliated Faculty

John Driscoll, M.F.A., Lecturer  
Barbara Molloy, M.F.A., Lecturer  
Gale Okumura, B.A., Lecturer  
Adele Zhang, M.F.A., Lecturer and Design Collection Curator

#### The Major Program

The Department of Design offers a creative, challenging, and flexible approach to the study of design with emphasis on socially responsible, human centered, and sustainable practice.

**The Program.** Foundation courses: Design and Visual Culture; Design Drawing, Form and Color, and Graphic Design and Computer Technology; are required of all design majors. One additional course in the student’s area of interest is required for Preparatory Subject Matter. Depth Subject Matter courses provide: (1) further exploration of design principles and conceptual, formal and technical issues; (2) conceptual and critical development through a series of history and theory classes; (3) in-depth studio experience with projects that demonstrate a research-based, iterative design process. Optional capstone class. A more detailed explanation is available through the Design Advising office in 107 Art Building; 530-752-6244.

**Portfolios.** Portfolios are not required for admission to the major. However, it is highly recommended that design students maintain an updated portfolio of visual work for faculty and professional evaluation and consideration for enrollment in spe-

cialized courses, including independent study, group study and internship.

**Internships, Careers, and Study Abroad.** Design students are encouraged to supplement their coursework with internships in design firms, museums, and design related businesses. Design graduates go directly from this program into further graduate study, or professional work including exhibition, fashion, information, interior architecture and product (lighting and furniture), textiles, visual communications (digital, environmental and print) and sustainable design. In addition, students have become entrepreneurs through freelance and commissioned work in many related areas. The Department of Design encourages students to experience design education abroad through a variety of sponsored programs. For more information, contact UC Davis Study Abroad.

## A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter.....</b>	<b>28</b>
Design 1 .....	4
Art 2 or Design 14 .....	4
Design 15 .....	4
Design 16 .....	4
University Writing Program 11,18 or 19 .....	4
Design 40A, 40B, or 40C.....	4
One course from the following: Design 21, 31, 37, 50, 60, 70, 77; Art 9.....	4
<b>Depth Subject Matter .....</b>	<b>44</b>
Two courses, at least one of which must be a Design course, from the following: Art 110A, 110B; Design 107, 115, 117, 127B, 150A; Dramatic Art 128; Technocultural Studies 100.....	8
Three courses, at least two of which must be Design courses, from the following: Art History 168, 184, 187, 188A, 188B, 189; Design 127A, 138, 142A, 142B, 143, 144, 145, 149; Dramatic Art 114, 150, 155; Technocultural Studies 150, 152, 153, 155, 159.....	12
Choose six courses from the lists below:.. 24 <i>List A:</i> Design 116, 131, 132A, 132B, 134A, 134B, 135A, 135B, 136A, 136B, 137A, 137B, 150B, 151, 155A, 160, 161, 170, 171, 177, 180A, 185, 186, 191. One course from the following approved list may count: ART 113, 114A, Chicano Studies 172, Dramatic Art 124A, 124B, 124C, 124D, 124E, 130, 170, Technocultural Studies 104, 130, 131; Textiles and Clothing 163 and 163L <i>List B:</i> Capstone Course Option (these courses are the most advanced in the major and prerequisites are strictly enforced): Design 154, 157, 159, 179, 180B, 187	24
Note: Substitutions for the listed courses may be allowed under certain circumstances with prior departmental approval.	
<b>Total Units for the Major .....</b>	<b>72</b>

**Honors Program.** A senior honors program is available to design majors, requiring preparation of an independent design research project in their final year. The honors program consists of 6 units of DES 194HA and DES 194HB, normally taking during the final two quarters of the senior year. Completion of the program is a prerequisite for High or Highest Honors at graduation. See the Design Department website for current honors application procedures.

**Major Adviser.** Information on the current Academic Advisers can be obtained by contacting the Undergraduate Adviser at [designmasteradviser@ucdavis.edu](mailto:designmasteradviser@ucdavis.edu).

**Graduate Study.** The graduate program in Design leading to the Master of Fine Arts

The UC Davis Master of Fine Arts (M.F.A.) in Design unites theory and practice, offering graduate students a unique opportunity to work with a dedicated and renowned design faculty within one of the nation's top public research universities. This two-

year program encourages an interdisciplinary approach. Design faculty expertise includes design theory, exhibition, fashion, history, interior architecture, lighting, textiles, and visual communication (environmental, information, print and screen-based design). Design M.F.A. students collaborate with outstanding faculty inside and outside the department whose work covers a broad array of disciplines. Graduate students in Design blend individually focused research and creative practice with an understanding of key design issues in history, theory, research methodology, and sustainable practices. The M.F.A. degree culminates in a project-based thesis and exhibition. For more information, see <http://arts.ucdavis.edu/design-graduate-program>.

**Graduate Adviser.** Please contact the Program at 530-752-8710.

## Courses in Design (DES)

Questions pertaining to the following courses should be directed to the instructor or to the Design Advising office in 107 Art 530-752-6244. Scheduling of classes is subject to change; please contact the Advising office to confirm when a course is offered.

### Lower Division

#### 1. Introduction to Design (4)

Lecture—3 hours; discussion—1 hour. Priority given to Design majors. Introduction to design discipline through readings, writing, visual problem solving, and critical analysis. Topics: design principles and elements, vocabulary, color theory, Gestalt principles, conceptualization strategies. Role of designer and products in contemporary culture including social responsibility and sustainability. GE credit: ArtHum | AH, VL.—F. (W.) Housefield

#### 14. Design Drawing (4)

Studio—4 hours; lecture/discussion—2 hours. Prerequisite: course 1 (may be taken concurrently); students with a background in drawing or Advanced Placement Art Studio units are encouraged to submit a portfolio for review to waive this course. Priority given to Design majors. Drawing as a tool for design. Basic skills in objective observation and representation, including line, shape, tone, and space. Drawing as a tool for formulating and working through design problems. GE credit: ArtHum | AH, VL.—F, W, S, Su. (F, W, S, Su.) McNeil

#### 15. Form and Color (4)

Studio—4 hours; lecture/discussion—2 hours. Prerequisite: course 1 (may be taken concurrently) or consent of instructor. Priority given to Design majors. Understanding color, form and composition as ways of communicating design concepts and content. Color theory, color mixing, interaction of color. Design principles and elements. Gestalt theory. Explores a variety of materials, media and presentation techniques. GE credit: ArtHum | AH, VL.—F, W, S, Su. (F, W, S, Su.) Snyder

#### 16. Graphic Design and Computer Technology (4)

Studio—4 hours; lecture/discussion—2 hours. Prerequisite: course 1 (may be taken concurrently) or consent of instructor. Priority given to Design students. Introduction to digital tools with emphasis on graphic design including theory, practice and technology. Includes principles of color, resolution, pixels, vectors, image enhancement, layout, visual organization, visual hierarchy, typography. GE credit: ArtHum | AH, VL.—F, W, S, Su. (F, W, S, Su.)

#### 21. Drafting and Perspective (4)

Studio—4 hours; lecture/discussion—2 hours. Prerequisite: course 1 (may be taken concurrently) or consent of instructor. Priority given to Design majors. Introduction to mechanical drafting, including scaled drawing, orthogonal projection, isometric, axonometric and perspective. Includes basic rendering techniques. GE credit: ArtHum | AH, VL.—F, Su. (F, Su.) Kessler

#### 31. Photography for Designers (4)

Studio—4 hours; lecture/discussion—2 hours. Prerequisite: course 1, 14 or 21, 15, 16 or consent of instructor. Pass One priority given to Design majors. Visual communication and digital imaging tech-

niques using black and white, and color. Critical analysis of photographs and the role of photography in society combining theoretical perspectives with practical applications. Explore use and meaning of single, sequence, and single composite images. GE credit: ArtHum | AH, VL.—F, W. (F, W.) Drew

#### 37. Coding for Designers (4)

Studio—4 hours; lecture/discussion—2 hours. Prerequisite: course 1, 14 or 21, 15, 16 or consent of instructor. Pass One priority to Design majors. Programming concepts and skills as applied for visual design. Algorithm-based design and development, flowcharts, pseudo-code, entry level scripting or programming. Principles of coding, logic, syntax, structure. Analysis of historical examples of code-based design. Development, iteration, presentation of design projects. GE credit: VL.—F, Su. (F, Su.) Drew

#### 40A. Energy, Materials, and Design Over Time (4)

Lecture—3 hours; discussion—1 hour. Priority to Design majors. Global history of design across time, viewed through the lens of the effects of the creation and discovery of new energy sources, processes and materials on design. Not open for credit to students who have taken course 40 or 140. GE credit: ArtHum | AH, DD, VL, WE.—W. (W.) Cogdell

#### 40B. Ideologies of Design (4)

Lecture—3 hours; discussion—1 hour. Priority to Design majors. Introduction to the history and theory of design in particular relation to political, philosophical, cultural, economic, and environmental debates and objectives. GE credit: ArtHum | AH, WE.—S. (S.) Sadler

#### 40C. Design for Aesthetics and Experience (4)

Lecture—3 hours; discussion—1 hour. Priority to Design majors. Global historical survey of design's engagement with changing notions of aesthetics and experience. Relates transformations in the theory, production, and reception of all aspects of design (objects, landscapes, architectures, etc.) to larger cultural, social, and political contexts. Not open for credit to students who have taken course 40 or 140. GE credit: ArtHum | AH, DD, WE.—S. (S.) Housefield

#### 50. Introduction to Three-Dimensional Design (4)

Studio—4 hours; lecture/discussion—2 hours. Prerequisite: course 1 or consent of instructor. Priority given to Design majors. Design concept development and detailing as it relates to the making of objects, structures and models using form, scale and materials. Product design and rapid prototyping methods using a range of techniques for advancing the design process. GE credit: ArtHum | AH, VL.—F, W, S, Su. (F, W, S, Su.) Snyder

#### 70. Introduction to Textile Design Structures (4)

Studio—4 hours; lecture/discussion—2 hours. Prerequisite: course 1 (may be taken concurrently) or consent of instructor. Introduction to diverse methods for creating textile structures. Exploration of the creative potential of hand-constructed textiles, manipulation of fabric to create dimensional surfaces, and the basics of building and joining fabric structures. Only two units of credit to students who have completed courses 23 or 24. Not open for credit for students who have completed both 23 and 24. GE credit: ArtHum | AH, VL.—F. (F.) Avila

#### 77. Introduction to Structural Design for Fashion (4)

Studio—4 hours; lecture/discussion—2 hours. Prerequisite: course 1 (may be taken concurrently) or consent of instructor. Priority given to Design majors. Study and practice of designing clothing for the human body. Emphasis on flat pattern development, structural joining sequences and the development of three-dimensional garments from two-dimensional drawings. Not open for credit to students who have completed course 77A. GE credit: ArtHum | AH, VL.—F, W. (F, W.) Koo

**99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division****107. Advanced Structural Design for Fashion (4)**

Studio—4 hours; lecture/discussion—2 hours. Prerequisite: course 1, 14 or 21, 15, 16 or consent of instructor. Priority given to Design majors. Advanced study and practice of designing clothing for the human body through pattern development and structural joining. Emphasis on draping techniques and advanced conceptualization for fashion design. Not open for credit to students who have taken course 77B. GE credit: ArtHum | AH, VL.—S. (S.) Koo

**115. Letterforms and Typography (4)**

Studio—4 hours; lecture/discussion—2 hours. Prerequisite: course 1, 14 or 21, 15, 16 or consent of instructor. Priority given to Design majors. Fundamentals of letterforms and typography. Characteristics of typefaces; formatting and composition of type. Principles of legibility, visual hierarchy, grid systems, and the integration of type and image. Not available for credit to students who have completed course 22. GE credit: ArtHum | AH, VL.—F, W, S, Su. (F, W, S, Su.) Verba

**116. Visual Communication: Graphic Design Studio (4)**

Studio—4 hours; lecture/discussion—2 hours. Prerequisite: course 1, 14 or 21, 15, 16, 115 or consent of instructor. Priority given to Design majors. Multiple, conceptually-linked assignments focusing on the fundamental choices designers make in translating concepts into effective graphic form. Problem finding and analysis of audience needs. Design process from research and initial concepts to project prototypes. Not open for credit to students who have completed course 152 or 152A. GE credit: ArtHum | AH, VL.—W, S, Su. (W, S, Su.) Verba

**117. Interactive Media I (4)**

Studio—4 hours; lecture/discussion—2 hours. Prerequisite: course 1, 14 or 21, 15, 16 or consent of instructor. Priority given to Design majors. Practice of creating interactive visual media for network-based applications and principles of human computer interaction. Responsive design. User-centered research, information architecture, interface and interaction. Analysis of usability. Development and presentation of design production materials and completed interactive projects. GE credit: ArtHum | AH, VL.—W, S, Su. (W, S, Su.) Drew

**127A. Sustainable Design (4)**

Lecture/discussion—4 hours. Prerequisite: course 1. Priority to Design majors. Principles, practice and materials of contemporary sustainable design in the context of environmental crisis. History of sustainable design in relation to the fields of textiles, visual communication, interior architecture, exhibition design and lighting. GE credit: ArtHum | AH, VL.—F, (F.)

**127B. Studio Practice in Sustainable Design (4)**

Studio—4 hours; lecture/discussion—2 hours. Prerequisite: course 1, 127A or consent of instructor. Priority to Design majors. Analysis and practice of sustainable design within studio context. Design project that incorporate the reuse of post consumer waste; standard materials vs. sustainable materials; Cradle to Cradle philosophy and practice. Field trips required. GE credit: ArtHum | AH, VL.—S. (S.)

**131. Global Fashion and Product Design (4)**

Studio—4 hours; lecture/discussion—2 hours. Prerequisite: course 1, 14 or 21, 15, 16 or consent of instructor. Priority given to Design majors. Exploration of materials, embellishments, and structural techniques derived from historic and contemporary world cultures. Emphasis on unique qualities of individual expression applied to hand made textiles, fashion and textile products. Offered irregularly. GE credit: ArtHum | AH, VL.—Avila

**132A. Textile Design: Woven Structures (4)**

Studio—4 hours; lecture/discussion—2 hours. Prerequisite: course 1, 14 or 21, 15, 16 or consent of instructor. Priority given to Design majors. Foundation course in handwoven textile structure and design, emphasizing yarn identification, basic drafting, basic weaves and their derivatives explored in context of original color effects and yarn combinations. May be repeated one time for credit with consent of instructor. Offered irregularly. GE credit: ArtHum | AH, VL.—Avila

**132B. Loom-Constructed Textile Design (4)**

Studio—4 hours; lecture/discussion—2 hours. Prerequisite: course 1, 14 or 21, 15, 16, 132A or consent of instructor. Priority to Design majors. Intermediate level study of complex fabric structure with emphasis on pattern in relation to surface, dimension, and material. May be repeated one time for credit with consent of instructor. Offered irregularly. GE credit: ArtHum | AH, VL.—Avila

**134A. Introduction to Interior Design—Residential (4)**

Studio—4 hours; lecture/discussion—2 hours. Prerequisite: course 1, 21 or 150A or consent of instructor. Priority to Design majors. Introduction to the theory and practice of interior design with focus on residential spaces. Basic methods of design conceptualization, development, and presentation. GE credit: ArtHum | AH, VL.—F. (F.) Kessler

**134B. Introduction to Interior Design—Commercial and Technical Spaces (4)**

Studio—4 hours; lecture/discussion—2 hours. Prerequisite: course 1, 21 or 150A or consent of instructor. Pass One priority given to Design majors. Introduction to the theory and practice of interior design with focus on small commercial and technical spaces. Archetypal spaces, non-residential building systems, ADA accessibility, design programming and research methods. GE credit: ArtHum | AH, VL.—F, W, S. (F, W, S.) Kessler

**135A. Furniture Design and Detailing (4)**

Studio—4 hours; lecture/discussion—2 hours. Prerequisite: course 1, 14 or 21, 15, 16 or consent of instructor. Priority given to Design majors. Development of designs for contemporary furniture. Consideration of behavioral and physical requirements, cultural and historic expression, and structural and aesthetic qualities. Process includes research, drawings, and construction of scale models. Required field trip. GE credit: ArtHum | AH, VL.—W. (W.)

**135B. Furniture Design and Prototyping (4)**

Studio—4 hours; lecture/discussion—2 hours. Prerequisite: course 1, 14 or 21, 15, 16 or consent of instructor. Priority given to Design majors. Design and construction of full size prototype furniture based on preliminary work completed in course 135A. Material technology, construction methods, and finishes discussed. Development of shop drawings and furniture construction. Required field trip. Offered irregularly. GE credit: ArtHum | AH, VL.

**136A. Lighting Technology and Design (4)**

Laboratory—4 hours; lecture/discussion—2 hours. Prerequisite: course 1, 14 or 21, 15, 16 or consent of instructor. Priority to Design majors. Introduction to lighting design and technology. Understanding the role of lighting and vision in the development of functional and aesthetically pleasing environments. GE credit: ArtHum | AH, VL.—F. (F.) Siminovitch

**136B. Designing with Light—Industrial Design (4)**

Laboratory—4 hours; lecture/discussion—2 hours. Prerequisite: course 1, 14 or 21, 15, 16, 136A or consent of instructor. Priority to Design majors. Design and manipulation of light sources, luminaires, and lighting controls to enhance the functional and aesthetic impact of interior and exterior spaces. Industrial design projects explore lighting effects, light distribution characteristics, and luminaire design. GE credit: ArtHum | AH, VL.—W. (W.) Siminovitch

**137A. Daylighting and Interior Design (4)**

Studio—4 hours; lecture/discussion—2 hours. Prerequisite: course 1, 14 or 21, 15, 16 or consent of instructor. Priority to Design majors. Emphasis on understanding the effect of daylight on the perception of interior designs as well as on vision, luminous and thermal comfort, health and energy efficiency. GE credit: ArtHum | AH, VL.—F. (F.) Papamichael

**137B. Daylighting Design Studio (4)**

Studio—4 hours; lecture/discussion—2 hours. Prerequisite: course 1, 14 or 21, 15, 16 or consent of instructor. Priority to Design majors. Introduction to daylighting through observation of its effects on interior designs using scale models of interior designs of choice and photographing them outdoors and in CLTC's Heliodon to understand year-round performance. GE credit: ArtHum | AH, VL.—S. (S.) Papamichael

**138. Materials and Methods in Interior Design (4)**

Lecture/discussion—3 hours; project—1 hour. Prerequisite: course 1 or consent of instructor. Priority to Design majors. Introduction to the finish materials used for interior design with special emphasis on sustainable and recycled products. Performance factors, relative costs and energy impacts, installation conditions and construction details, and design potential for a full range of interior materials. Offered in alternate years. GE credit: ArtHum | AH, VL, WE.—Kessler

**142A. World Textiles: Eastern Hemisphere (4)**

Lecture—4 hours. Prerequisite: course 1; Art History 1A, 1B, 1C, or 1D recommended. Social contexts, meanings, aesthetics, stylistic developments, and methods significant in eastern hemisphere textiles. Emphasis on Japan, China, Indonesia, Oceania, Southern and Central Asia, Africa. Offered irregularly. GE credit: ArtHum, Div | AH.—Avila

**142B. World Textiles: Western Hemisphere (4)**

Lecture—4 hours. Prerequisite: course 1, Art History 1A, 1B, or 1C recommended. Social context, aesthetics, stylistic developments and methods significant in western hemisphere textiles. Emphasis on the Middle East, Europe, and the Americas up to contemporary times. Two required field trips. GE credit: ArtHum, Div | AH.—Avila

**143. History of Fashion (4)**

Lecture—3 hours; discussion—1 hour. Priority to Design majors. History of fashion design from the earliest times to the present focusing on the ancient Middle East and Common Era North America and Europe. Emphasis on aesthetic, functional, social, economic, political and cultural aspects of clothing and personal adornment. GE credit: ArtHum | AH, VL.—W. (W.) Avila

**144. History of Interior Architecture (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Pass One priority to Design majors. Thematic survey of interior architecture. Emphasis on dwellings in their cultural settings and development of modern interior design theories. Interiors considered in relation to buildings' exteriors, sites, and uses. Offered in alternate years. GE credit: ArtHum | AH, WE.—Housefield

**145. History of Visual Communication (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Priority to Design majors. Historical developments of visual communication, concentrating on the technological and aesthetic development of graphic design; origins and manifestations of current issues in visual communication; provide framework for analysis of current and future trends in visual communication. GE credit: ArtHum | AH, VL, WE.—F, S. (F, S.) Drew

**149. Information Design: Principles and Practice (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Restricted to students with upper division standing. Design principles and visual strategies for effective information display; analysis of contemporary and

historical examples of visual representations and visual narratives in science, humanities, and the arts; emergence of digital methods for interactive data presentation. GE credit: AH, VL.—S. (S.) Verba

#### **150A. Computer-Assisted Drawing for Designers (4)**

Studio—4 hours; lecture/discussion—2 hours. Pre-requisite: courses 1, 14 or 21, 15, 16 or consent of instructor; 21 preferred. Priority given to Design majors. Computer assisted drawing and modeling using a mid-level, multi-use CAD program. Basic architectural drawing and modeling technique in both two-dimensional and three-dimensional CAD environments. Not open for credit to students who have taken course 150. GE credit: ArtHum | AH, VL.—F, W. (F, W.)

#### **150B. Computer-Assisted Presentations for Interior Architecture (4)**

Studio—4 hours; lecture/discussion—2 hours. Pre-requisite: course 1, 14 or 21, 15, 16, 150A or consent of instructor; 21 recommended. Priority given to Design majors. Computer-assisted architectural presentation including the development of complex 3D models, techniques of photo-realistic rendering and computer simulation of movement through architectural and interior space. Offered irregularly. GE credit: ArtHum | AH, VL.—S. (S.)

#### **151. Type in Motion (4)**

Studio—4 hours; lecture/discussion—2 hours. Pre-requisite: courses 1, 14 or 21, 15, 16 or consent of instructor; course 115 recommended. Priority given to Design majors. Fundamentals of creating motion-based, screen-based typography. Consideration of narrative structures, movement assemblage, and other visual languages, synthesized within a nuanced understanding of typography within digital space. GE credit: ArtHum | AH, VL.—F. (F.) Drew

#### **154. Visual Communication: Message Campaign Design (4)**

Studio—4 hours; lecture/discussion—2 hours. Pre-requisite: course 1, 14 or 21, 15, 16, 115, 116 or consent of instructor. Priority given to Design majors. Principles and application of visual design strategies for projects that address a broad public audience. Emphasis on design for social awareness/interaction/benefit. Creation of public visual-media campaign. Not open for credit to students who have completed course 152B. GE credit: ArtHum | AH, VL.—S. (S.) Verba

#### **155A. Pattern, Form and Surface (4)**

Studio—4 hours; lecture/discussion—2 hours. Pre-requisite: course 1, 14 or 21, 15, 16, 115 or consent of instructor. Experimental approaches to form-making through an examination of pattern, form, and surface in historical and contemporary contexts. Explorations of alternative design processes, methods, and materials that open up new possibilities for content creation and invention in design practice. GE credit: VL.—W. (W.) Verba

#### **157. Interactive Media II (4)**

Studio—4 hours; lecture/discussion—2 hours. Pre-requisite: course 1, 14 or 21, 15, 16, (37 or 111) and 117 or consent of instructor. Priority to Design majors. Technical and conceptual aspects of creating web sites that address current trends, such as CSS for type and position and interactivity with ActionScript. Attention to conceptual framework, visual design and user interaction design. Research and written pre-production materials required. GE credit: ArtHum | AH, VL.—S. (S.) Drew

#### **159. Design for Understanding (4)**

Studio—4 hours; lecture/discussion—2 hours. Pre-requisite: course 1, 14 or 21, 15, 16, 115, 116 or consent of instructor; course 117 recommended. Pass One open to Design majors. Principles of effective information display including aspects of language, structure, legibility, sequencing, and context. Analysis of historical examples of typographic, diagrammatic, and cartographic excellence. User-centered research. Development and presentation of iterative design prototypes. Design that informs, connects, and inspires. GE credit: ArtHum | AH, VL.—S. (S.) Verba

#### **160. Textile Surface Design: Patterns and Resists (4)**

Studio—4 hours; lecture/discussion—2 hours. Pre-requisite: course 1, 14 or 21, 15, or consent of instructor. Use of traditional and contemporary processes to create images and patterns on fabric using a variety of dyes, including direct applications, bound and mechanical resists. Emphasis on individual exploration and interpretation of processes and techniques. May be repeated for credit one time with consent of instructor. GE credit: ArtHum | AH, VL.—S. (S.) Avila

#### **161. Textile Surface Design: Screen and Digital Printing (4)**

Studio—4 hours; lecture/discussion—2 hours. Pre-requisite: course 1, 14 or 21, 15 and 16. Design of textiles and screen printing on fabrics; soft-product development; integration of hand-produced and digitally generated imagery on cloth. GE credit: ArtHum | AH, VL.—F. (F.) Avila

#### **170. Experimental Fashion & Textile Design (4)**

Studio—4 hours; lecture/discussion—2 hours. Pre-requisite: course 1, 14 or 21, 15, 16 or consent of instructor. Priority to Design majors. Experimental approaches to fashion and textile design. Emphasis on developing conceptual ideas and translating them into one-of-a-kind garments and soft products. Exploration of a variety of current topics including sustainability, pattern design, new technologies, and social activism. May be repeated one time for credit with consent of instructor. GE credit: ArtHum | AH, VL.—Su. (Su.) Koo

#### **171. Fashion Drawing: Technical and Illustration (4)**

Studio—4 hours; lecture/discussion—2 hours. Pre-requisite: course 1, 14 or 21, 15, 16 or consent of instructor. Priority to Design majors. Exploration of fashion design processes for industry within the social and physical context. Emphasis on two-dimensional conceptualization of ideas, garment construction, and ideation processes utilizing commercial textiles. Field trip required. GE credit: ArtHum | AH, VL.—F, S. (F, S.) Koo

#### **177. Computer-Assisted Fashion Design (4)**

Studio—4 hours; lecture/discussion—2 hours. Pre-requisite: course 1, 14 or 21, 15, 16 and 77 or consent of instructor. Priority to Design majors for industry and personal expression with emphasis on computer-assisted design applications. Field trip required. GE credit: ArtHum | AH, VL.—F. (F.) Koo

#### **179. Fashion Design: Signature Collection (4)**

Studio—4 hours; lecture/discussion—2 hours. Pre-requisite: course 1, 14 or 21, 15, 16, 77, (107 or 177) or consent of instructor. Priority to Design majors. Advanced exploration of fashion design with an emphasis on professional portfolio development and presentation. Emphasis on conceptualizing, designing, and fabricating a cohesive line of wearable garments suitable for presenting in a public fashion show. Not open for credit to students who have taken more than 8 units of course 191A. May be repeated one time for credit. GE credit: ArtHum | AH, VL.—W. (W.) Koo

#### **180A. Advanced Interior Design: Institutional Spaces (4)**

Studio—4 hours; lecture/discussion—2 hours. Pre-requisite: course 1 and (21 or 150A) or consent of instructor. Priority to Design majors. Advanced interior design problems focused on complex institutional spaces. Introduction to building codes related to interior design. Integration of building systems with interior design solutions. GE credit: ArtHum | AH, VL.—F, W. (F, W.) Kessler

#### **180B. Advanced Interior Architecture (4)**

Studio—4 hours; lecture/discussion—2 hours. Pre-requisite: course 134A, (134B or 180A) or consent of instructor. Priority to Design majors. Advanced problems in interior architectural design emphasizing space planning for corporate and institutional environments. Field trips required. GE credit: ArtHum | AH, VL.—W, S. (W, S.) Kessler

#### **185. Exhibition Design (4)**

Studio—4 hours; lecture/discussion—2 hours. Pre-requisite: course 1, 14 or 21, 15, 16 or consent of instructor; 150A recommended. Priority to Design majors. Design of cultural and commercial exhibition environments, including exhibition development and object selection, spatial planning and architectural finishes, object placement and staging, interpretive strategies, exhibition and promotional graphics. GE credit: ArtHum | AH, VL.—F. (F.) McNeil

#### **186. Environmental Graphic Design (4)**

Studio—4 hours; lecture/discussion—2 hours. Pre-requisite: course 1, 14 or 21, 15, 16 or consent of instructor; course 115 recommended. Priority to Design majors. Design of informational and directional graphics for the built environment. Application and integration of typography, imagery and symbols into the architectural landscape. Development of universal wayfinding and graphic navigational systems to help people find their way. GE credit: ArtHum | AH, VL.—W. (W.) McNeil

#### **187. Narrative Environments (4)**

Studio—4 hours; lecture/discussion—2 hours. Pre-requisite: course 1, 14 or 21, 15, 16 and 185 or 186 or consent of instructor. Design of storytelling environments and multi-sensory experiences for cultural, commercial, entertainment and public spaces. Interpretive planning and design for specific exhibit audiences. Manipulation of objects and the communication of complex ideas in the exhibition environment. GE credit: ArtHum | AH, VL.—S, Su. (S, Su.) McNeil

#### **190. Proseminar (1)**

Seminar—1 hour. Prerequisite: design major or consent of instructor. Philosophies of design explored through discussion and presentation of research results. May be repeated three times for credit when topic differs. (P/NP grading only.)

#### **191A. Workshops in Design (4-12)**

Seminar—1 hour; studio or field experience—3 hours per unit (units determined by instructor and student); field trip. Prerequisite: course 14, 15; upper division standing and consent of instructor. Faculty initiated workshops featuring advanced studies and applications of original work in Design: Costume. Letter grading by contract. Field trips included. Credit limited to 12 units in one section or a combination of sections.—F, W, S. (F, W, S)

#### **191B. Workshops in Design (4-12)**

Seminar—1 hour; studio or field experience—3 hours per unit (units determined by instructor and student); field trip. Prerequisite: course 14, 15; upper division standing and consent of instructor. Faculty initiated workshops featuring advanced studies and applications of original work in Design: Environment. Letter grading by contract. Field trips included. Credit limited to 12 units in one section or a combination of sections.—F, W, S. (F, W, S)

#### **191C. Workshops in Design (4-12)**

Seminar—1 hour; studio or field experience—3 hours per unit (units determined by instructor and student); field trip. Prerequisite: course 14, 15; upper division standing and consent of instructor. Faculty initiated workshops featuring advanced studies and applications of original work in Design: Graphics. Letter grading by contract. Field trips included. Credit limited to 12 units in one section or a combination of sections.—F, W, S. (F, W, S)

#### **191D. Workshops in Design (4-12)**

Seminar—1 hour; studio or field experience—3 hours per unit (units determined by instructor and student); field trip. Prerequisite: course 14, 15; upper division standing and consent of instructor. Faculty initiated workshops featuring advanced studies and applications of original work in Design: Textiles. Letter grading by contract. Field trips included. Credit limited to 12 units in one section or a combination of sections.—F, W, S. (F, W, S)

#### **192. Internship (1-6)**

Internship—3-18 hours. Prerequisite: completion of 84 units and consent of instructor. Enrollment limited to 3 units per quarter or 6 units per IV session. Supervised internship, off and on campus, in areas

of design including environmental, costume, textile, museum, display and interior design. (P/NP grading only.)

#### **194HA. Special Study for Honors Students (3)**

Independent study—9 hours. Prerequisite: qualification for Letters and Science Honors Program; senior standing; approval of Design Honors Program proposal by the Curriculum Committee and major adviser; consent of instructor. Limited enrollment. Preparation and presentation of a culminating project. Supervision of an instructor in one of the creative or scholarly areas of Design. (Deferred grading only, pending completion of sequence.)—W. (W.)

#### **194HB. Special Study for Honors Students (3)**

Independent study—9 hours. Prerequisite: course 194HA; qualification for Letters and Science Honors Program; senior standing; consent of instructor. Limited enrollment. Preparation and presentation of a culminating project. Supervision of an instructor in one of the creative or scholarly areas of Design. (Deferred grading only, pending completion of sequence.)—S. (S.)

#### **197T. Tutoring in Design (1-5)**

Discussion—3-15 hours. Prerequisite: upper division standing and consent of instructor. Leading of small discussion groups or studio meetings affiliated with one of the department's regular courses. (P/NP grading only.)

#### **198. Directed Group Study (1-5)**

Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

#### **199. Special Study of Advanced Undergraduates (1-5)**

(P/NP grading only.)

### **Graduate**

#### **221. Theory and Issues in Design (4)**

Seminar—3 hours; independent study. Prerequisite: graduate standing in Design or consent of instructor. Perspectives on theoretical and aesthetic issues related to the design professions such as methodology in historical and contemporary contexts, implications of technology on design theory and practice, and design relationships to environmental sustainability, recycling, and other social issues. May be repeated one time for credit.—F. (F.)

#### **222. Research Methods and Critical Writing for Design (4)**

Seminar—3 hours; independent study. Prerequisite: course 221; graduate standing in Design or consent of instructor. Focused on research methods and critical writing related to design topics including case studies, original and secondary sources, critical reviews. Expectation of a paper meeting professional standards suitable for publication from each student at end of course. May be repeated one time for credit.—W. (W.)

#### **223. Professional Practice and Ethics in Design (4)**

Seminar—3 hours; independent study. Prerequisite: courses 221, 222; graduate standing in Design or consent of instructor. Introduce students to issues of professional design practice: business ethics, contracts and business practices, social responsibility through case studies, guest lectures and field trips, and readings. Short written assignments and presentations will be required.—S. (S.)

#### **224. Seminar in Design Research and Teaching (4)**

Independent study—6 hours; extensive writing—4 hours; discussion—2 hours. Prerequisite: courses 221, 222, 223; concurrent academic appointment (TA) in courses 142A, 142B, 143, 144, 145; graduate standing in Design; consent of instructor. Student will work closely with instructor on a research and writing project related to subject matter of undergraduate history courses noted above with the goal of introducing student to advanced historical research processes and development of writing skills. May be repeated two times for credit.—F, W, S. (F, W, S.)

#### **225. Studio Practice in Design (4)**

Studio—3 hours. Prerequisite: course 221. Restricted to graduate standing in Design or consent of instructor. Students work together on a collective project to experience the multiple phases of design through an iterative process. Design projects will be geared towards relevance in contemporary social, cultural and political contexts. May be repeated two times for credit.—W. (W.)

#### **290. Seminar in Design (4)**

Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Selected topics in design methodology, research, communication, and education. May be repeated for credit.—S. (S.)

#### **292. Practicum in Design (1-12)**

Prerequisite: graduate standing in Design or consent of instructor. Interaction with a working professional in the student's field of interest to apply theories and concepts to working practice. (S/U grading only.)

#### **298. Directed Group Study for Graduate Students (1-5)**

Studio. Prerequisite: consent of instructor. (S/U grading only.)

#### **299. Individual Focused Study (1-12)**

Prerequisite: graduate standing in Design or consent of instructor. Advanced study in studio practice on independent projects with faculty consultation. May be repeated for credit.—F, W, S. (F, W, S.)

#### **299D. Project Concentration (1-12)**

Prerequisite: graduate standing in Textile Arts and Costume Design or consent of instructor. A minimum of 22 units must be taken in Project Concentration and Individual Focused Study. Student creates a body of original work at a professional level, with written and visual documentation of process and concepts underlying the project, culminating in public presentation. (S/U grading only.)—S. (S.)

### **Professional**

#### **396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## **Dietetics**

See [Clinical Nutrition, on page 216.](#)

## **Dramatic Art**

See [Theatre and Dance, on page 568.](#)

## **Earth and Planetary Sciences**

(College of Letters and Science)

Dawn Y. Sumner, Ph.D., Chairperson of the Department

David A. Osleger, Ph.D., Vice-Chairperson of the Department

**Department Office.** 2119 Earth and Physical Sciences Building 530-752-0350;  
<http://www.geology.ucdavis.edu>

### **Faculty**

Magali I. Billen, Ph.D., Professor  
Sandra J. Carlson, Ph.D., Professor  
William H. Casey, Ph.D., Professor (*Chemistry*)  
Kari M. Cooper, Ph.D., Professor  
Eric S. Cowgill, Ph.D., Professor  
Graham E. Fogg, Ph.D., Professor  
(*Land, Air and Water Resources*)  
Tessa M. Hill, Ph.D., Associate Professor  
Louise H. Kellogg, Ph.D., Professor  
Charles E. Lesher, Ph.D., Professor

James S. McClain, Ph.D., Professor

*Academic Senate Distinguished Teaching Award*  
Isabel P. Montañez, Ph.D., Professor

Ryosuke Motani, Ph.D., Professor

Sujoy Mukhopadhyay, Ph.D., Professor

Alexandre Navrotsky, Ph.D., Professor (*Chemistry*)

Michael E. Oskin, Ph.D., Professor

David A. Osleger, Ph.D., Lecturer SOE

*Academic Senate Distinguished Teaching Award*  
Nicholas Pinter, Ph.D., Professor

John B. Rundle, Ph.D., Professor  
(*Physics, Earth and Planetary Sciences*)

Howard J. Spero, Ph.D., Professor

Sarah T. Stewart, Ph.D., Professor

Dawn Y. Sumner, Ph.D., Professor

Geerat J. Vermeij, Ph.D., Professor

Kenneth L. Verosub, Ph.D., Professor

*Academic Senate Distinguished Teaching Award*  
Qing-zhu Yin, Ph.D., Professor

Robert A. Zierenberg, Ph.D., Professor

### **Emeriti Faculty**

Cathy J. Busby, Ph.D., Professor Emerita

Richard Cowen, Ph.D., Senior Lecturer Emeritus

*Academic Senate Distinguished Teaching Award*

Howard W. Day, Ph.D., Professor Emeritus

John F. Dewey, Ph.D., Professor Emeritus

James A. Doyle, Ph.D., Professor Emeritus

(*Evolution and Ecology*)

Charles G. Higgins, Ph.D., Professor Emeritus

Eldridge M. Moores, Ph.D., Professor Emeritus

Jeffrey F. Mount, Ph.D., Professor Emeritus

James R. Rustad, Ph.D., Professor Emeritus

Peter Schiffman, Ph.D., Professor Emeritus

Donald L. Turcotte, Ph.D., Professor Emeritus

Robert J. Twiss, Ph.D., Professor Emeritus

**Major Programs.** See Geology, Marine and Coastal Science, and Natural Sciences.

**Courses.** See courses listed under Geology.

### **Geology Major Programs**

"Civilization exists by geological consent—subject to change without notice." —Will Durant

Geology is the study of the Earth, and in particular its history, structure, and the processes that have molded our planet and its biosphere. Geology involves the origin of continents and ocean basins, earthquakes and volcanoes, variations in global climate, and how these physical changes impact the evolution of life. All of these planetary processes are viewed through the prism of "deep time," a perspective unique to geologists and one that distinguishes geology from most of the other physical sciences.

A significant component of geology is oriented toward the interaction between humans and the Earth. This aspect includes the study of resources such as minerals, oil, and water; identification and mitigation of Earth hazards such as earthquakes, landslides, floods, and volcanic eruptions; identification and mitigation of polluted ground water; land use planning; and the study of ancient and modern climate change.

**The Program.** Students interested in becoming professional geologists or continuing their geological studies at the graduate level should choose the Bachelor of Science degree program. The Bachelor of Arts program is for students interested in an interdisciplinary program of study, or who plan to go into pre-college teaching. Both programs allow students to emphasize an aspect of the field of particular interest to them. The upper division electives are not restricted to geology courses but must be chosen to provide a relevant, coherent, and in-depth program of study. Transfer students should have completed as much as possible of the preparatory subject matter listed below.

**Internships and Career Alternatives.** In recent years in California, the largest employers of geologists have been environmental and geotechnical consulting firms, with oil companies, research laboratories and government agencies also providing opportunities. Students graduating with a Bachelor's degree may get entry-level positions in the private



Biological Sciences 2A-2B-2C .....	15
Geology 2, 3, 3L, 50L, 60 .....	13
Mathematics 16A-16B-16C or 17A-17B-17C or 21A-21B-21C .....	9-12
Physics 7A-7B-7C or 9A-9B-9C .....	12-15
Statistics 100 .....	4

**Depth Subject Matter.....42**

Concentration (chosen from among the four fields of concentration listed below) ..... 27  
 Supplementary Field; chosen from among the four fields listed below. May not include the same field as the concentration. The same course may not be used to fulfill the requirements for both a Concentration and a Supplementary Field. ..... 15

**Total Units for the Major.....110-116****Fields of Concentration:**

Chemistry .....	27-36
Chemistry 105 .....	4
Chemistry 107A-107B or 110A-110B-110C .....	6-12
Chemistry 118A-118B or 128A-128B-129A-129B .....	8-10
Chemistry 124A .....	3
One course from Chemistry 100, 104, 118C, 128C .....	3-4
Three units from Chemistry 197, 199 or Education/Geology 181, 183 .....	3
Earth Science .....	27
Geology 62, 101, 101L, 105, 109, 109L, 116N, 163 .....	21
Once course from Geology 107, 108, 131 .....	3
Three units from Geology 199 or Education/Geology 181, 183 .....	3
Life Science .....	27-33
Chemistry 8A-8B or 118A-118B-118C .....	6-12
Biological Sciences 101 .....	4
Evolution and Ecology 100, 101 or approved electives and Biological Sciences 105 .....	8
Neurobiology, Physiology, and Behavior 101 .....	5
Four units from Biological Sciences 199, Evolution and Ecology 199, Molecular and Cellular Biology 199, or Neurobiology, Physiology, and Behavior 199 or Education/Geology 181, 183 .....	4
Physics .....	27
Chemistry 107A, 110A .....	7
Geology 161, 162, 163 .....	9
Physics 108, 108L, 160 .....	7
Four units from Physics 199 or Education/Geology 181, 183 .....	4

**Supplementary Fields:**

Chemistry .....	15-17
Chemistry 100 .....	3
Chemistry 104 or 105 .....	3-4
Chemistry 107A .....	3
Chemistry 118A or 128A .....	3-4
Chemistry 124A .....	3
Other Chemistry or related science courses may be substituted with the prior approval of the major adviser.	
Earth Science .....	15
Geology 108, 109, 109L, 116N .....	10
Geology 138 or 140 .....	4
Approved elective .....	1
Other Geology or related science courses may be substituted with the prior approval of the major adviser.	
Life Science .....	15
Biological Sciences 101* .....	4
Evolution and Ecology 100 .....	4
Neurobiology, Physiology, and Behavior 101 .....	5
Approved electives .....	2
Other Biological Sciences or related science courses may be substituted with the prior approval of the major adviser.	
Physics .....	15
Physics 108 .....	3

Chemistry 107A .....	7
Geology 161, 162, 163 .....	9
Approved electives .....	2
Other Physics or related science courses may be substituted with the prior approval of the major adviser.	

\*Note: Students pursuing a concentration in earth science or physics may not have had the necessary prerequisites in organic chemistry.

**Major Advisers.** T.M. Hill, R. Motani

**Related Major Program.** See also *Marine and Coastal Science*, on page 416.

**Courses in Geology (GEL)****Lower Division****1. The Earth (4)**

Lecture—3 hours; discussion—1 hour. Introduction to the study of the Earth. Earth's physical and chemical structure; internal and surface processes that mold the Earth; geological hazards and resources. Not open for credit to students who have completed course 50. Only 2 units of credit to students who have completed course 2. GE credit: SciEng | SE, SL, WE.—F, W, S. (F, W, S.) Mukhopadhyay, Osleger

**2. The Blue Planet: Introduction to Earth Science (3)**

Lecture—3 hours. Study of the solid and fluid earth and its place in the solar system. Holistic examination of how the solid earth interacts with the atmosphere, hydrosphere, biosphere, and extraterrestrial environment. Not open for credit to students who have completed course 50. Only 2 units of credit to students who have completed course 1. GE credit: SciEng | SE, SL, WE.—F, W, S. (F, W, S.) Montañez

**2G. The Blue Planet: Introduction to Earth Science Discussion (1)**

Discussion—1 hour. Prerequisite: course 2 concurrently. Small group discussion and preparation of short papers for course 2. GE credit: SciEng, Wrt | SE, WE.—W. (W.) Montañez

**3. History of Life (3)**

Lecture—3 hours. Prerequisite: course 1 recommended. The history of life during the three and one half billion years from its origin to the present day. Origin of life and processes of evolution; how to visualize and understand living organisms from their fossil remains. GE credit: SciEng | SE.—W. (W.) Motani

**3G. History of Life: Discussion (1)**

Discussion—1 hour. Prerequisite: course 3 concurrently. Small group discussion and preparation of short papers for course 3. GE credit: SciEng, Wrt | SE, WE.—W. (W.) Motani

**3L. History of Life Laboratory (1)**

Laboratory—3 hours. Prerequisite: course 3 concurrently. Exercises in understanding fossils as the clues to interpreting ancient life, including their functional morphology, paleoecology, and evolution. GE credit: SciEng | SE.—W. (W.) Motani

**4. Evolution: Science and World View (3)**

Lecture—2 hours; discussion—1 hour. Introduction to biological evolution. Emphasis on historical development, major lines of evidence and causes of evolution; relationships between evolution and Earth history; the impact of evolutionary thought on other disciplines. GE credit: SciEng | SE, SL, WE.—S. (S.) Vermeij

**10. Modern and Ancient Global Environmental Change (3)**

Lecture—3 hours. Fundamental scientific concepts underlying issues such as global warming, pollution, and the future of non-sustainable resources presented in the context of anthropogenic processes as well as natural forcing of paleoenvironmental change throughout Earth's history. GE credit: SciEng | SE, SL, VL.—F. (F.) Montañez

**12. Evolution and Paleobiology of Dinosaurs (2)**

Lecture—2 hours. Introduction to evolutionary biology, paleobiology, ecology and paleoecology, using dinosaurs as case studies. GE credit: SciEng | SE.—F, W. (F, W.) Carlson

**16. The Oceans (3)**

Lecture—3 hours. Introductory survey of the marine environment. Oceanic physical phenomena, chemical constituents and chemistry of water, geological history, the seas biota and human utilization of marine resources. Not open for credit to students who have taken course 116. GE credit: SciEng | SE, SL.—W. S. (W, S.) Hill, Spero

**16G. The Oceans: Discussion (2)**

Discussion/laboratory—2 hours; term paper or discussion. Prerequisite: course 16 concurrently. Scientific method applied to discovery of the processes, biota and history of the oceans. Group discussion and preparation of term paper. Not open for credit to students who have taken course 116G. GE credit: SciEng, Wrt | SE, WE.—W. (W.) Hill

**17. Earthquakes and Other Earth Hazards (2)**

Lecture—2 hours. Impact of earthquakes, tsunami, volcanoes, landslides, and floods on humans, structures, and the environment. Discussion of the causes and effects of disasters and catastrophes, and on prediction, preparation, and mitigation of natural hazards. GE credit: SciEng | SE, SL.—F, W, S. (F, W, S.) Billen, Kellogg

**18. Energy and the Environment (3)**

Lecture—3 hours. Conventional and alternative energy resources and their environmental impacts. Basic principles, historical development, current advantages and disadvantages, future prospects. Oil, natural gas, coal, nuclear, wind, geothermal, water, tidal, solar, hydrogen, and other sources of energy for the 21st century. GE credit: SciEng | SE, SL, WE.—W. (W.) Verosub

**18V. Energy and the Environment (3)**

Web virtual lecture—1.5 hours; web electronic discussion—1.5 hours. Conventional and alternative energy resources and their environmental impacts. Basic principles, historical development, current advantages and disadvantages, future prospects. Oil, natural gas, coal, nuclear, wind, geothermal, water, tidal, solar, hydrogen, and other sources of energy for the 21st century. GE credit: SciEng | SE, SL, WE.—W. (W.) Verosub

**20. Geology of California (2)**

Lecture—2 hours. The geologic history of California, the origin of rocks and the environments in which they were formed, the structure of the rocks and the interpretation of their structural history, mineral resources, and appreciation of the California landscape. Offered in alternate years. GE credit: SciEng | SE, SL, VL.—W. Cowgill

**25. Geology of National Parks (3)**

Lecture—3 hours. Appreciation of the geologic framework underlying the inherent beauty of U.S. National Parks. Relationship of individual parks to geologic processes such as mountain building, volcanism, stream erosion, glacial action and landscape evolution. GE credit: SciEng | SE, SL, VL.—F. (F.) Osleger

**25V. Geology of National Parks (3)**

Web virtual lecture—1 hour; web electronic discussion—2 hours. Appreciation of the geologic framework underlying the inherent beauty of U.S. National Parks. Relationship of individual parks to geologic processes such as mountain building, volcanism, stream erosion, glacial action and landscape evolution. No credit for students who have completed course 25. GE credit: SciEng | SE.—S. (S.) Gee (UC San Diego), Osleger (UC Davis), Schwarz (UC Santa Cruz)

**28. Astrobiology (3)**

Lecture—3 hours. Origin, evolution and distribution of life in our solar system and the Universe. Detecting habitable worlds, Drake equations, necessities

and raw materials for life, philosophical implications of the search for life elsewhere. GE credit: SciEng | SE, SL. —F. (F.) Yin

### **30. Fractals, Chaos and Complexity (3)**

Lecture/discussion—3 hours. Prerequisite: Mathematics 16A or 21A. Modern ideas about the unifying ideas of fractal geometry, chaos and complexity. Basic theory and applications with examples from physics, earth sciences, mathematics, population dynamics, ecology, history, economics, biology, computer science, art and architecture. (Same course as Physics 30.) Offered in alternate years. GE credit: SciEng | QL, SE, SL. —(W.) Rundle

### **32. Volcanoes (3)**

Lecture—3 hours. Role of eruptions, and eruptive products of volcanoes in shaping the planet's surface, influencing its environment, and providing essential human resources. GE credit: SciEng | SE, —S. (S.) Cooper

### **35. Rivers (3)**

Lecture—3 hours. Introduction to geomorphology, climate and geology of rivers and watersheds, with case examples from California. Assessment of impacts of logging, agriculture, mining, urbanization and water supply on river processes. Optional river field trips. GE credit: SciEng | SE, SL.

### **36. The Solar System (4)**

Lecture—3 hours; discussion—1 hour. Nature of the sun, moon, and planets as determined by recent manned and unmanned exploration of the solar system. Comparison of terrestrial, lunar, and planetary geological processes. Search for life on other planets. Origin and evolution of the solar system. (Former course 113-113G.) GE credit: SciEng, Wrt | SE, VL, WE. —S. (S.) Osleger, Stewart

### **50. Physical Geology (3)**

Lecture—3 hours. Prerequisite: high school physics and chemistry. The Earth, its materials, its internal and external processes, its development through time by sea-floor spreading and global plate tectonics. Students with credit for course 1 or the equivalent may receive only 2 units for course 50. GE credit: SciEng | SE, SL. —F. W. (F, W.) Billen, Cooper, Lesher, Zierenberg

### **50L. Physical Geology Laboratory (2)**

Laboratory—6 hours. Prerequisite: course 50 concurrently. Introduction to classification and recognition of minerals and rocks and to interpretation of topographic and geologic maps and aerial photographs. Students with credit for course 1L or the equivalent may receive only 1 unit for course 50L. GE credit: SciEng | SE, —F, W. (F, W.) Billen, Cooper, Lesher, Zierenberg

### **60. Earth Materials: Introduction (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 2A; Mathematics 16A or 17A or 21A; course 1 or 50; course 50L. Physical and chemical properties of rocks, minerals and other earth materials; structure and composition of rock-forming minerals; formation of minerals by precipitation from silicate liquids and aqueous fluids and by solid state transformations. GE credit: SciEng | SE. —F. (F.)

### **62. Optical Mineralogy (2)**

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 60 (can be concurrent). Optical properties of inorganic crystals; techniques of mineral identification using the polarizing microscope; strategies for studying rocks in thin section. GE credit: SciEng | SE, VL. —F. (F.)

### **81. Learning in Science and Mathematics (2)**

Lecture/discussion—2 hours; field work—2 hours. Limited to 26 students per section. Exploration of how students learn and develop understanding in science and mathematics classrooms. Introduction to case studies and interview techniques and their use in K-6 classrooms to illuminate factors that affect student learning. (Same course as Education 81.) (P/NP grading only.) GE credit: SS, VL, WE. —F, W, S. (F, W, S.) Latimer, Stevenson

### **91. Geology of Campus Waterways (1)**

Lecture/discussion—1 hour; fieldwork—1 hour. Research characterizing geological processes in waterways on campus including links among hydrologic, atmospheric, physical, and human processes; carbon cycling and interpreting processes from sediments; field research techniques; research project design and implementation; implications of results for society and environmental policy. May be repeated for credit three times. (P/NP grading only.) GE credit: SE, SL. —F, W, S. (F, W, S.) Motani

### **92. Internship (1-12)**

Internship—3-36 hours. Prerequisite: consent of instructor; lower division standing. Work-learn experience on and off campus in all subject areas offered by the department. Internships supervised by a member of the faculty. May be repeated for credit up to 12 units. (P/NP grading only.) GE credit: SE. —F, W, S. (F, W, S.)

### **98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. May be repeated for credit. May be repeated for credit up to three times. (P/NP grading only.) GE credit: SE. —F, W, S. (F, W, S.)

### **99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor; lower division standing. (P/NP grading only.) GE credit: SE. —F, W, S. (F, W, S.)

## **Upper Division**

### **101. Structural Geology (3)**

Lecture—3 hours. Prerequisite: courses 50 and 50L; Physics 7A or 9A; Mathematics 16A or 17A or 21A; consent of instructor. Class size limited to 35 students. Study of processes and products of rock deformation. Introduction to structural geology through a survey of the features and geometries of faults and folds, techniques of strain analysis, and continuum mechanics of rock deformation. GE credit: SciEng | SE. —W. (W.) Cowgill, Oskin

### **101L. Structural Geology Lab (2)**

Laboratory—6 hours; fieldwork—2 hours. Prerequisite: courses 50 and 50L; Physics 7A or 9A; course 101 concurrently; consent of instructor. Class size limited to 15 students per session. Laboratory study of the processes and products of rock deformation. Introduction to the practice of structural geology through observations and analysis of rock deformation, including field measurement techniques and geologic mapping. GE credit: SciEng | SE, VL. —W. (W.) Cowgill, Oskin

### **103. Field Geology (3)**

Fieldwork; laboratory. Prerequisite: course 101 and 101L; consent of instructor. Field mapping projects and writing geological reports. Weekly classroom meetings devoted to preparation of maps, cross sections, stratigraphic sections, rock descriptions, and reports. Seven-eight days on weekends during quarter. GE credit: SciEng | SE, VL, WE. —S. (S.) Cowgill, Lesher

### **105. Earth Materials: Igneous Rocks (4)**

Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 60, 62; Mathematics 16A or 17A or 21A; Chemistry 2B (can be concurrent). Origin and occurrence of igneous rocks. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section. GE credit: SciEng, Wrt | SE, WE. —W. (W.) Cooper, Lesher

### **106. Earth Materials: Metamorphic Rocks (4)**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 105. Physical and chemical properties of metamorphic rocks; interpretation of metamorphic environments. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section. GE credit: SciEng, Wrt | SE, WE. —S. (S.) Lesher

### **107. Earth History: Paleobiology (3)**

Lecture—3 hours. Prerequisite: course 3 or Biological Sciences 2A or Biological Sciences 10. Evolution and ecological structure of the biosphere from the origin of life to the present. GE credit: SciEng | SE. —F, W, S. (F, W, S.) Carlson, Motani

### **107L. Earth History: Paleobiology Laboratory (2)**

Laboratory—6 hours. Prerequisite: courses 3 and 3L or Biological Sciences 2B; course 107 concurrently. Exercises in determining the ecological functions and evolution of individuals, populations, and communities of fossil organisms in field and laboratory. GE credit: SciEng | SE. —F, W, S. (F, W, S.) Carlson, Motani

### **108. Earth History: Paleoclimates (3)**

Lecture—3 hours. Prerequisite: course 1 or 50 or 116N or Environmental Science and Policy 116N; Chemistry 2A; consent of instructor. Geological and environmental factors controlling climate change, the greenhouse effect with a detailed analysis of the history of Earth's climate fluctuations over the last 600 million years. Past and present climate records are used to examine potential future climatic scenarios. GE credit: SciEng, Wrt | SE, SL, WE. —S. (S.) Spero, Montañez

### **109. Earth History: Sediments and Strata (2)**

Lecture—2 hours. Prerequisite: courses 50, 50L. Principles of stratigraphic and sedimentologic analysis. Evaluation of historical and modern global changes in sedimentation within terrestrial and marine environments. Examination of the plate tectonic, climatic and oceanographic factors controlling the distribution and exploitation of economic fluids within sedimentary rocks. GE credit: SciEng | SE. —W. (W.) Summer

### **109L. Earth History: Sediments and Strata Laboratory (2)**

Laboratory—6 hours. Prerequisite: course 109 concurrently. Methods of stratigraphic and sedimentologic analysis of modern and ancient sediments. Identification of major sediment and sedimentary rock types. Outcrop and subsurface analysis of sedimentary basins. GE credit with concurrent enrollment in course 109. Includes four one-day field trips. GE credit: SciEng, Wrt | SE, WE. —W. (W.) Summer

### **110. Summer Field Geology (8)**

Fieldwork. Prerequisite: course 103, course 109; course 105 recommended. Advanced application of geologic and geophysical field methods to the study of rocks. Includes development and interpretation of geologic maps and cross sections; gravity, magnetic, electrical resistivity and seismic surveys; and field analysis of plutonic and volcanic rock suites. Eight hours/day, six days/week for six weeks. GE credit: SciEng, Wrt | SE, VL, WE. —Su. (Su.) Oskin, Cowgill

### **115. Earth Science, History, and People (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing; course 1. Study of interplay between the Earth and its human inhabitants through history, including consideration of acute events such as earthquakes and eruptions as well as the geology of resources, topography, and water. GE credit: SciEng or SocSci, Wrt | OL, SE, WE. —S. (S.) Verosub

### **116N. Oceanography (3)**

Lecture—2 hours; laboratory—3 hours; field work. Prerequisite: course 1 or 2 or 16 or 50. Advanced oceanographic topics: Chemical, physical, geological, and biological processes; research methods and data analysis; marine resources, anthropogenic impacts, and climate change; integrated earth/ocean/atmosphere systems; weekly lab and one weekend field trip. (Same course as Environmental Science & Policy 116N.) Offered in alternate years. GE credit: SciEng | SE, SL. —W. Hill, McClain

### **120. Origins: From the Big Bang to Today (3)**

Lecture—3 hours. Limited enrollment. Long-term and large-scale perspectives on the origins of the universe, stars and planets, life, human evolution, the rise of civilization and the modern world. Multi-disciplinary approach to 'Big History' involving cosmology, astronomy, geology, climatology, biology, anthropology, archeology and traditional history. GE credit: SciEng | SE. —S. (S.) Osleger

**130. Non-Renewable Natural Resources (3)**

Lecture—3 hours. Prerequisite: course 1 or 50. Origin, occurrence, and distribution of non-renewable resources, including metallic, nonmetallic, and energy-producing materials. Problems of discovery, production, and management. Estimations and limitations of reserves, and their sociological, political, and economic effects. Offered in alternate years. GE credit: SciEng | SE, SL.—F. (F.) Verosub

**131. Risk: Natural Hazards and Related Phenomena (3)**

Lecture—3 hours. Risk, prediction, prevention and response for earthquakes, volcanic eruptions, landslides, floods, storms, fires, impacts, global warming. GE credit: SciEng | SE, SL.—W. (F.) Rundle

**132. Introductory Inorganic Geochemistry (3)**

Lecture—3 hours. Prerequisite: course 60 (can be concurrent); Chemistry 2B. Nucleosynthesis of chemical elements, physical and chemical properties of elements, ionic substitution, elemental partition, distribution and transport among planetary materials, basic thermodynamics and phase diagrams, isotopic geochronometers, stable isotope fractionation, mixing and dilution, advection and diffusion, geochemical cycles. Offered in alternate years.—F. Yin

**134. Environmental Geology and Land Use Planning (3)**

Lecture—3 hours. Prerequisite: one course in Geology or course 1 or course 50; consent of instructor. Geologic aspects of land use and development planning. Geologic problems concerning volcanic and earthquake hazards, land stability, floods, erosion, coastal hazards, non-renewable resource extraction, waste disposal, water resources. GE credit: SciEng, Wrt | SE, WE.—W. (W.) Pinter

**136. Ecogeomorphology of Rivers and Streams (5)**

Lecture—1 hour; discussion/laboratory—2 hours; fieldwork; term paper or discussion. Prerequisite: upper division or graduate standing in any physical science, biological science, or engineering, and consent of instructor. Restricted to advanced students in the physical sciences, biological sciences, or engineering. Integrative multidisciplinary field analysis of streams. Class project examines hydrology, geomorphology, water quality and aquatic and riparian ecology of degraded and pristine stream systems. Includes cooperative two-week field survey in remote wilderness settings with students from diverse scientific backgrounds. GE credit: SciEng | SE, WE.—S. (S.) Pinter

**138. Introductory Volcanology (4)**

Lecture—2 hours; fieldwork—6 hours. Prerequisite: course 60 and 109; consent of instructor. Principles of physical and chemical volcanology. Taught in a volcanically active setting (e.g., Hawaii) with a strong field component. GE credit: SciEng | SE.—F. (F.) Zierenberg

**139. Rivers: Form, Function and Management (4)**

Lecture—3 hours; fieldwork—3 hours. Prerequisite: course 50 or 50L; Mathematics 16B or 21B recommended. Analysis of river form and processes, emphasis on fluvial geomorphology, and river and stream restoration; case studies to illustrate concepts and applications. Two weekend field trips required. Offered in alternate years. GE credit: SciEng | SE.—F. Pinter

**140. Introduction to Process Geomorphology (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 1 or 50; Mathematics 16B or 21B. Quantitative description and interpretation of landscapes with emphasis on the relationships between physical processes, mass conservation, and landform evolution. Topics covered include physical and chemical weathering, hillslopes, debris flows, fluvial systems, alluvial fans, pedogenesis, eolian transport, glaciation and Quaternary geochronology. Offered in alternate years.—F. (F.) Oskin, Pinter

**141. Evolutionary History of Vertebrates (3)**

Lecture—3 hours. Prerequisite: course 3 or Biological Sciences 2A. Evolutionary history of vertebrates; fossil record and phylogeny; timing of major evolutionary events; appearance of major vertebrate groups; physical constraints in vertebrate evolution; paleobiogeography of vertebrates; effect of continental movement on vertebrate evolution; dinosaurs and other strange vertebrates. Offered in alternate years. GE credit: SciEng | SE.—(W.) Motani

**141L. Evolutionary History of Vertebrates Laboratory (1)**

Laboratory—3 hours. Prerequisite: course 141 (can be concurrent). Augments lecture course 141 through handling of specimens enabling in-person examination of three dimensional features observed in vertebrate skeletons, both fossil and living. Offered in alternate years. GE credit: SciEng | SE.—(W.) Motani

**142. Basin Analysis (3)**

Laboratory—3 hours; lecture—2 hours. Prerequisite: courses 50, 50L, and 109. Analysis of sedimentary basins from initiation to maturity, including controls on sedimentary fill, subsidence analysis, sequence stratigraphy, core logs, and applications to petroleum exploration and hydrology. One two-day field trip. Offered in alternate years. GE credit: SciEng | SE, VL.—(F.) Sumner

**143. Advanced Igneous Petrology (5)**

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 105, Mathematics 16C or 21C, Chemistry 2C. Physical and chemical properties of magmatic environments and processes of igneous rock formation. Laboratory study of representative igneous rocks. Offered in alternate years. GE credit: SciEng, Wrt | SE, WE.—W. (W.) Pinter

**144. Historical Ecology (3)**

Lecture—3 hours. Prerequisite: upper division course in environmental science or ecology, or an introductory course in paleobiology. Ancient ecosystems and the factors that caused them to change. Species, expansion, evolution of new modes of life, geologically induced variations in resource supply, and extinction provide historical perspective on the biosphere of future. GE credit: SciEng | SE, WE.—W. (W.) Vermeij

**145. Advanced Metamorphic Petrology (5)**

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 106; Hydrologic Science 134 or Chemistry 2C; Mathematics 16C or 21C. Metamorphic processes and the origin of metamorphic rocks. Laboratory study of representative rock suites. Offered in alternate years. GE credit: SciEng, Wrt | SE.—Lesher

**146. Radiogenic Isotope Geochemistry and Cosmochemistry (3)**

Lecture—3 hours. Prerequisite: Chemistry 2C, Physics 7C, and Mathematics 16C. Basic principles of nuclear chemistry and physics applied to geology to determine the ages of terrestrial rocks, meteorites, archeological objects, age of the Earth, to trace geological/environmental processes, and explain formation of the chemical elements in the Universe. Offered in alternate years. GE credit: SciEng | QL, SE.—F. Yin

**147. Geology of Ore Deposits (4)**

Lecture—3 hours; laboratory—3 hours; optional one-weekend field trip. Prerequisite: Chemistry 2C or Hydrologic Science 134, courses 60, 62, and 105. Tectonic, lithologic and geochemical setting of major metallic ore deposit types emphasizing ore deposit genesis, water/rock interaction and the environmental effects of mining. Offered in alternate years. GE credit: SciEng | QL, SE.—(S.) Zierenberg

**148. Stable Isotopes and Geochemical Tracers (3)**

Lecture—3 hours. Prerequisite: Chemistry 2C or Hydrologic Science 134; courses 50, 50L, 60. Use of oxygen and hydrogen isotopes in defining hydrologic processes; carbon, nitrogen, and sulfur isotopes as indicators of exchange between the lithosphere, hydrosphere, atmosphere and bio-

sphere. Radiogenic, cosmogenic, and noble gas isotope tracers. Offered in alternate years. GE credit: SciEng | QL, SE.—S. Zierenberg

**149. Geothermal Systems (3)**

Lecture—3 hours; fieldwork. Prerequisite: courses 50 and 50L; Chemistry 2B. Geology, geochemistry, and geophysics of geothermal systems, including electrical power generation and direct use applications. Includes one day field trip on a weekend during the quarter. GE credit: SciEng | SE.—W. (W.) Zierenberg

**150A. Physical and Chemical Oceanography (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 116N or Environmental Science and Policy 116N; Physics 9B, Mathematics 21D, Chemistry 2C; consent of instructor. Physical and chemical properties of seawater, fluid dynamics, air-sea interaction, currents, waves, tides, mixing, major oceanic geochemical cycles. (Same course as Environmental Science and Policy 150A.) GE credit: SciEng | QL, SE.—F. (F.) McClain, Spero

**150B. Geological Oceanography (3)**

Lecture—3 hours. Prerequisite: course 50 or course 116N or Environmental Science and Policy 116N. Introduction to the origin and geologic evolution of ocean basins. Composition and structure of oceanic crust; marine volcanism; and deposition of marine sediments. Interpretation of geologic history of the ocean floor in terms of sea-floor spreading theory. (Same course as Environmental Science and Policy 150B.) GE credit: SciEng | SE.—W. (W.) McClain

**150C. Biological Oceanography (4)**

Lecture—3 hours; discussion—1 hour; fieldwork. Prerequisite: Biological Sciences 2A; a course in general ecology. Ecology of major marine habitats, including intertidal, shelf benthic, deep-sea and plankton communities. Existing knowledge and contemporary issues in research. Segment devoted to human use. One weekend field trip required. (Same course as Environmental Science and Policy 150C.) GE credit: SciEng | SE, SL.—Su. (Su.) Hill

**152. Paleobiology of Protista (4)**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 107 or Biological Sciences 2A; consent of instructor. Morphology, systematics, evolution, and ecology of single-celled organisms that are preserved in the fossil record. Offered in alternate years. GE credit: SciEng | SE.—Hill

**156. Hydrogeology and Contaminant Transport (5)**

Lecture—3 hours; laboratory—3 hours; term paper. Prerequisite: Hydrologic Science 145, Civil and Environmental Engineering 144 or the equivalent. Physical and chemical processes affecting groundwater flow and contaminant transport, with emphasis on realistic hydrogeologic systems. Groundwater geology and chemistry. Fundamentals of groundwater flow and transport analysis. Laboratory includes field pumping test and work with physical and computer models. (Same course as Hydrologic Science 146.) GE credit: SciEng | SE.—W. (W.) Fogg

**160. Geological Data Analysis (3)**

Lecture/discussion—3 hours. Prerequisite: Mathematics 21A. Introduction to quantitative methods in analyzing geological data including basic principles of statistics and probability, error analysis, hypothesis testing, inverse theory, time series analysis and directional data analyses. Use of computer in lectures and homework. GE credit: SciEng | QL, SE.—W. (W.) Rundle

**161. Geophysical Field Methods (3)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 50; Mathematics 21C; Physics 7C or 9C. Geophysical methods applied to determining subsurface structure in tectonics, hydrogeology, geotechnical engineering, hydrocarbon and mineral exploration. Theory, survey design and interpretation of gravity, electrical resistivity, electromagnetic, reflection and refraction seismology, and ground-penetrating radar measurements. GE credit: SciEng | QL, SE.—F. (F.) Billen

**162. Geophysics of the Solid Earth (3)**

Lecture—3 hours. Prerequisite: Mathematics 21C; Physics 7C or Physics 9C; consent of instructor. Theory and use of physics in the study of the solid earth. Gravity, magnetism, paleomagnetism, and heat flow. Application to the interpretation of the regional and large-scale structure of the earth and to plate tectonics. Offered in alternate years. GE credit: SciEng | QL, SE. —(W.) Kellogg

**163. Planetary Geology and Geophysics (3)**

Lecture—3 hours. Prerequisite: Mathematics 21C; Physics 7C or Physics 9C; course 50 or course 36 or Astronomy 10G or Astronomy 10L or Astronomy 10S; consent of instructor. Principles of planetary science. Planetary dynamics, including orbital mechanics, tidal interactions and ring dynamics. Theory of planetary interiors, gravitational fields, rotational dynamics. Physics of planetary atmospheres. Geological processes, landforms and their modification. Methods of analysis from Earth-based observations and spacecraft. Offered in alternate years. GE credit: SciEng | QL, SE. —(W.) Yin

**175. Advanced Field Geology (3)**

Discussion—3 hours; fieldwork—6 hours. Prerequisite: consent of instructor. Advanced field studies of selected geologic terrains, interpretation and discussion of field observations. May be repeated two times for credit when instructors varies. (P/NP grading only.) GE credit: SE.—Cooper, Roeske

**181. Teaching in Science and Mathematics (2)**

Lecture/discussion—2 hours; field work—2 hours. Prerequisite: major in mathematics, science, or engineering; or completion of a one-year sequence of science or calculus and consent of the instructor. Class size limited to 40 students per section. Exploration of effective teaching practices based on examination of how middle school students learn math and science. Selected readings, discussion and field experience in middle school classrooms. (Same course as Education 181.) (P/NP grading only.) GE credit: SS, WE.—F, W, S. (F, W, S.) Horn

**182. Field Studies in Marine Geochemistry (2-8)**

Lecture—3 hours; laboratory—1-3 hours; fieldwork—6-40 hours. Prerequisite: consent of instructor. Marine geochemistry with the opportunity of going to sea or into the field on land. Techniques of sea-floor mapping using bottom photography, marine geochemical sampling, and method of data reduction and sample analysis. Analysis of data/samples collected. GE credit: SciEng | SE.—Hill

**183. Teaching High School Mathematics and Science (3)**

Lecture/discussion—2 hours; field work. Prerequisite: course 81/Education 81 or course 181/Education 181 and major in mathematics, science, or engineering; or completion of a one-year sequence of science or calculus and consent of the instructor. Limited to 40 students per section. Exploration and creation of effective teaching practices based on examination of how high school students learn mathematics and science. Field experience in high school classrooms. (Same course as Education 183.) GE credit: SocSci | OL, SS, WE.—F, W, S. (F, W, S.) Pinter, Stevenson

**190. Seminar in Geology (1)**

Discussion—1 hour; seminar—1 hour; Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. Written abstracts. May be repeated for credit. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

**192. Internship in Geology (1-12)**

Internship. Prerequisite: upper division standing; project approval prior to internship. Supervised work experience in geology. May be repeated for credit for a total of 10 units. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

**194A. Senior Thesis (3)**

Prerequisite: open to Geology majors who have completed 135 units and who do not qualify for the honors program. Guided independent study of a

selected topic, leading to the writing of a senior thesis. (Deferred grading only, pending completion of course sequence.) GE credit: SciEng | SE, WE.—F, W, S. (F, W, S.)

**194B. Senior Thesis (3)**

Prerequisite: open to Geology majors who have completed 135 units and who do not qualify for the honors program. Guided independent study of a selected topic, leading to the writing of a senior thesis. (Deferred grading only, pending completion of course sequence.) GE credit: SciEng | SE, WE.—F, W, S. (F, W, S.)

**194HA. Senior Honors Project (3)**

Independent study—9 hours. Prerequisite: open to Geology majors who have completed 135 units and who qualify for the honors program. Guided independent study of a selected topic, leading to the writing of an honors thesis. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | SE, WE.—F, W, S. (F, W, S.)

**194HB. Senior Honors Project (3)**

Independent study—9 hours. Prerequisite: open to Geology majors who have completed 135 units and who qualify for the honors program. Guided independent study of a selected topic, leading to the writing of an honors thesis. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | SE, WE.—F, W, S. (F, W, S.)

**198. Directed Group Study (1-5)**

Prerequisite: senior standing in Geology or consent of instructor. (P/NP grading only.) GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

**Graduate****205. Advanced Field Stratigraphy (3)**

Lecture—1 hour; field work—2 hours. Prerequisite: courses 109 and 110 or consent of instructor; course 206 recommended. Fieldwork over spring break. Application of stratigraphic techniques to research problems. Collection, compilation, and interpretation of field data. Integration of data with models for deposition and interpretations of Earth history. Topics will vary. May be repeated for credit. Offered in alternate years.—S. (S.) Sumner

**206. Stratigraphic Analysis (3)**

Lecture—3 hours. Prerequisite: courses 109, 109L or consent of instructor; course 144 recommended. Topics in advanced methods of stratigraphic analysis, regional stratigraphy and sedimentation, and sedimentary basin analysis. Emphasis on techniques used to interpret stratigraphic record and on current issues in stratigraphy and sedimentation. May be repeated for credit when topic differs. Offered in alternate years.—W. (W.) Montañez

**214. Active Tectonics (3)**

Lecture/discussion—3 hours. Prerequisite: graduate standing or consent of instructor. Active deformation associated with faults, landslides, and volcanoes. Geodetic measurement techniques such as triangulation, trilateration, leveling, Global Positioning System (GPS), and radar interferometry. GPS data acquisition and analysis. Inversion of geodetic data and mechanical models of crustal deformation. Offered in alternate years.—S. (S.) Oskin

**216. Tectonics (3)**

Lecture/discussion—3 hours. Prerequisite: course 101 or consent of instructor. Nature and evolution of tectonic features of the Earth. Causes, consequences, and evolution of plate motion, with selected examples from the Earth's deformed belts. Offered in alternate years.—Cowgill

**217. Topics in Geophysics (3)**

Lecture—1 hour; seminar—2 hours. Prerequisite: consent of instructor. Discussion and evaluation of current research in a given area of geophysics. Topic will change from year to year. May be repeated for credit. Offered in alternate years.—F, S. (F, S.) Billen, Kellogg, McClain

**218. Analysis of Structures in Deformed Rocks (3)**

Seminar—3 hours. Prerequisite: courses 100, 100L, 101, 101L, 170; or consent of instructor. Recent advances in the understanding and analysis of structures in brittlely and ductilely deformed rocks. Detailed investigation of the characteristics of the structures, models for their formation, and applications to inferring the kinematics of larger scale tectonics. Offered in alternate years.—Cowgill

**219. Fracture and Flow of Rocks (3)**

Lecture—3 hours. Prerequisite: courses 100, 101, Mathematics 21 or 16, Physics 7 or 9, or consent of instructor. Origins of those structures in rocks associated with brittle and ductile deformation. Theoretical analysis, using continuum mechanics, and experimental evidence for the origin of the structures with emphasis on deformational processes in the earth. Offered in alternate years.—S. (S.) Billen

**220. Mechanics of Geologic Structures (3)**

Lecture—3 hours. Prerequisite: course 170, Mathematics 21C, Physics 9A or 5A, or consent of instructor; Mathematics 21D and 22A recommended. Development in tensor notation of the balance laws of continuum mechanics, and constitutive theories of elasticity, viscosity, and plasticity and their application to understanding development of geologic structures such as fractures, faults, dikes, folds, foliations, and boudinage. Offered in alternate years.—Cowgill, Oskin

**226. Advanced Sedimentary Petrology (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 144 or consent of instructor. Advanced petrography and geochemistry of sediments and sedimentary rocks. Geochemical, textual and mineralogical evolution of sedimentary rocks reflecting depositional or burial processes. Laboratory work emphasizes thin section study of rocks. May be repeated for credit when topic differs. Offered in alternate years.—W. (W.) Sumner

**227. Stable Isotope Biogeochemistry (4)**

Lecture—2 hours; laboratory—6 hours. Prerequisite: graduate standing and consent of instructor. Discussion and application of stable isotope techniques for scientific research problems. Course emphasizes carbon, oxygen, nitrogen, hydrogen and sulfur isotopes. Laboratory will develop basic skills of cryogenic gas extraction and specific techniques for individual research using stable isotopes. Offered in alternate years.—Spero

**228. Topics in Paleoceanography (3)**

Lecture—3 hours. Prerequisite: courses 108, 150A or consent of instructor. Critical discussion and review of selected topics in paleoceanography and paleoclimatology relating to the history of the processes controlling and affecting climate change and ocean circulation throughout the geologic record. Topics vary. May be repeated for credit. Offered in alternate years.—W. (W.) Spero

**230. Geomorphology and River Management (3)**

Seminar—3 hours. Prerequisite: graduate standing, course 139 or equivalent. Impacts of management and land use activities on the geomorphology of rivers and streams. Evaluation and use of analytical tools for river assessment. Assessment of river and stream restoration strategies and emerging issues in river management. May be repeated for credit when topic differs. Offered in alternate years.—Pinter

**232. The Oceans and Climate Change (3)**

Lecture/discussion—3 hours. Prerequisite: graduate standing or consent of instructor. Modern climate change and linkages between the ocean-atmospherecryosphere-terrestrial climate system. Importance of the ocean in forcing climate change, and the impacts of anthropogenic processes on the ocean. Topics vary. May be repeated three times for credit. Offered in alternate years.—W. (W.) Hill

**235. Surface Processes (3)**

Seminar—3 hours. Prerequisite: courses 50, 50L, 139; Mathematics 21B or 16B recommended. Recent advances in the analysis of landforms and their evolution. Detailed investigation of the tools

used to document surface processes. Evaluation of concepts and processes that govern landscape evolution. May be repeated for credit when topic differs. Offered in alternate years.—S. (S.) Oskin

### **236. Inverse Theory in Geology and Geophysics (3)**

Lecture—3 hours. Prerequisite: consent of instructor. Inversion of data for model parameters. Evaluation of parameter uncertainties. Linear and nonlinear problems for discrete and continuous models. Bakus-Gilbert inversion. Offered in alternate years.—S. (S.) McClain

### **238. Theoretical Seismology (3)**

Lecture—3 hours. Prerequisite: consent of instructor. Elastodynamic wave equation. Greens functions and source representations. Ray theory. Plane and spherical waves and boundary conditions. Elastic wave propagation in stratified media. Offered in alternate years. (P/NP grading only.)—S. (S.) McClain

### **240. Geophysics of the Earth (3)**

Lecture—3 hours. Prerequisite: Earth Sciences and Resources 201, Physics 9B, Mathematics 22B. Physics of the earth's crust, mantle, and core. Laplace's equation and spherical harmonic expression of gravity and magnetic fields. Elastic wave equation in geologic media. Body and surface seismic waves. Equations of state, thermal structure of the earth. Offered in alternate years.—S. (S.) Kellogg

### **241. Geomagnetism (3)**

Lecture—3 hours. Prerequisite: graduate standing. Nature and origin of the Earth's magnetic field. Present field and recent secular variation. Spherical harmonic analysis. Paleosecular variation. Polarity transitions and geomagnetic excursions. Statistics of polarity intervals. Dynamo theory. Planetary magnetism. Offered in alternate years.—F. (F.) Verosub

### **242. Paleomagnetism (3)**

Lecture—3 hours. Prerequisite: graduate standing. Principles and applications of paleomagnetism. Physical basis of rock and mineral magnetism. Field and laboratory techniques. Instrumentation. Analysis of paleomagnetic data. Statistical methods. Rock magnetic properties. Geological and geophysical applications. Offered in alternate years.—F. (F.) Verosub

### **246. Physical Chemistry of Metamorphic Processes (3)**

Lecture—3 hours. Prerequisite: course 145, Chemistry 110A, or consent of instructor. Physiochemical principles of metamorphic mineral assemblages and methods of interpreting the paragenesis of metamorphic rocks. Offered in alternate years.

### **247. Metamorphic Petrology Seminar (3)**

Seminar—3 hours. Prerequisite: course 145 or consent of instructor; course 246 recommended. Selected topics in metamorphic petrology (e.g., mass transport processes, tectonic settings, geothermometry, thermal structure of metamorphic belts, regional studies). May be repeated for credit when topic differs. (S/U grading only.) Offered in alternate years.

### **250. Advanced Geochemistry Seminar (3)**

Seminar—3 hours. Prerequisite: course 146 or consent of instructor. Critical review of selected topics in geochemistry including: ore genesis, hydrothermal and geothermal fluids, recent and ancient sediments, isotope geology, origin and chemistry of the oceans. Subject varies yearly depending on student interest. May be repeated for credit. Offered in alternate years.—Cooper, Zierenberg

### **251. Advanced Topics in Isotope Geochemistry and Cosmochemistry (3)**

Lecture/discussion—2 hours; term paper. Prerequisite: graduate standing or consent of instructor. Astrophysical context on origin of Solar System, synthesis of chemical elements, condensation sequence, star and planet formation, cosmochronology, building blocks of planets, development on planets' layered structure, atmosphere and hydrosphere and the role of comets/asteroids for volatile delivery. May be repeated three times for credit when topics differ. Offered in alternate years.—W. (W.) Yin

### **253. Current Topics in Igneous Petrology (3)**

Seminar—3 hours. Prerequisite: graduate standing in Geology; course 143 or consent of instructor. Topical seminar designed to help graduate students develop and maintain familiarity with current and past literature related to igneous rock petrogenesis. May be repeated for credit when topic differs. (S/U grading only.)—F. (F.) Cooper, Lesher

### **254. Physical Chemistry of Igneous Processes (3)**

Lecture—3 hours. Prerequisite: course 143 or consent of instructor; Chemistry 110A required; Chemistry 110B and 110C recommended. Introduction of modern concepts in chemical thermodynamics and kinetics, and fluid dynamics of magmatic systems for graduate students in petrology. Offered in alternate years.—Lesher

### **255. Experimental Petrology (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 143 or consent of instructor. Introduction to techniques and methods of design and executing experiments on Earth-forming minerals and rocks. Problems and examples from igneous and metamorphic petrology will be utilized. Offered in alternate years.—Lesher

### **260. Paleontology (3)**

Seminar—3 hours. Prerequisite: graduate standing in geology or a biological science. Selected problems in paleontology. Subject to be studied will be decided at an organizational meeting. May be repeated for credit when topic differs. Offered in alternate years.—F. S. (F. S.) Vermeij

### **261. Paleobiology Graduate Seminar 1: Evolutionary aspects (3)**

Lecture—1 hour; seminar—2 hours. Prerequisite: graduate standing in Geology or a biological science; qualified undergraduates accepted on an exception-only basis. This course will treat one or more of several topics in paleobiology from a phylogenetic perspective, including major patterns in evolution, building the tree of life, extinction and phylogeny, phylogeny of major phyla, and the relation between taxonomy and phylogeny. May be repeated for credit when topic varies. Offered in alternate years.—F. S. (F. S.) Carlson

### **262. Paleobiology Graduate Seminar: Methodological Aspects (3)**

Lecture—1 hour; seminar—2 hours. One or more major methods used in the study of fossils: Morphometrics and three-dimensional reconstruction of fossils, phylogenetic methodology, the application of geochemical techniques, and electron microscopy. May be repeated four times for credit if topic varies. Offered in alternate years.—S. (S.) Motani

### **281N. Instrumental Techniques for Earth Scientists (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 21A, 21B, 21C, Physics 7A, 7B, 7C or 9A, 9B, 9C or consent of instructor. Laboratory research techniques for new graduate students in Geology. Demonstration of and exposure to appropriate techniques in research. Offered in alternate years.—S. (S.) Spero, Yin

### **285. Field Studies in Marine Geochemistry (2-8)**

Lecture—3 hours; laboratory—1-3 hours; field-work—6-40 hours. Prerequisite: consent of instructor. Marine geochemistry with the opportunity of going to sea or into the field on land. Techniques of seafloor mapping using bottom photography, marine geochemical sampling, and method of data reduction and sample analysis. Analysis of data/samples collected.—Hill

### **290. Seminar in Geology (1)**

Seminar—1 hour; discussion—1 hour. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. (S/U grading only.)—F. W. S. (F. W. S.)

### **291. Geology of the Sierra Nevada (1)**

Seminar. Prerequisite: consent of instructor. Short oral presentations by students and faculty concerning results of their past work and plans for future

work in the Sierra. A written abstract is required following the format required at professional meetings. (S/U grading only.) Offered in alternate years.—S. (S.)

### **292. River Forum (1)**

Seminar—1 hour. Prerequisite: graduate standing. Review and discussion of latest research and fundamental issues surrounding riverine systems, with emphasis on physical processes. Topics vary. (S/U grading only.) Offered in alternate years.—F. W. S. (F. W. S.)

### **293. Geologic Event of the Week (1)**

Discussion—0.5 hours; seminar—0.5 hours. Prerequisite: graduate standing. Seminar/discussion group to review and discuss recent earthquakes, volcanic eruptions, and other significant geologic events. The focus is on understanding the available observations, the physical processes behind each event, the geological setting, and societal consequences. May be repeated for credit three times for up to three units. (S/U grading only.) Offered in alternate years.—F. W. S. (F. W. S.) Kellogg

### **294. Structure/Tectonics Forum (1)**

Seminar—1 hour. Prerequisite: graduate student in geology or consent of instructor. Seminar/discussion group to review and discuss latest research in structural geology and tectonics, and on-going research of participants. Topics will vary each quarter depending on the interests of the group. Occasional field trips to areas of current interest. May be repeated for credit when topic differs. (S/U grading only.) Offered in alternate years.—F. W. S. (F. W. S.) Roeske

### **295. Advanced Problems in Geodynamics (3)**

Seminar—3 hours. Prerequisite: courses 100 and 101 or consent of instructor. Seminar dealing with problems in geodynamics. Topics will vary (e.g., ductile deformation mechanisms, brittle fracture, earthquake prediction, driving forces for plate tectonics, mantle convection). Emphasis on recent literature. May be repeated for credit when topic differs. (S/U grading only.) Offered in alternate years.—F. W. S. (F. W. S.)

### **296. Advanced Problems in Tectonics (3)**

Seminar—3 hours. Prerequisite: course 101 or consent of instructor. Seminar dealing with current problems in tectonics of selected regions. Topics will change from year to year. Emphasis on study of recent literature. May be repeated for credit. (S/U grading only.) Offered in alternate years.—F. (F.) Cowgill

### **297. Geophysics Forum (1)**

Seminar—0.5 hours; discussion—0.5 hours. Prerequisite: graduate student status in the Geology Department, or consent of instructor. Seminar/discussion group to review and discuss latest research in geophysics, and on-going research of participants. Topics will change each quarter depending on the interests of the group. May be repeated three times for credit. (S/U grading only.) Offered in alternate years.—F. W. S. (F. W. S.) Kellogg

### **298. Group Study (1-5)**

Prerequisite: graduate standing or consent of instructor. May be repeated up to 10 units for credit. (S/U grading only.) Offered in alternate years.—F. W. S. (F. W. S.)

### **299. Research (1-12)**

(S/U grading only.)—F. W. S. (F. W. S.)

### **Professional**

### **390. Methods of Teaching Geology (2)**

Extensive writing or discussion—2 hours. Prerequisite: graduate student standing in Geology. Introduction to graduate-level writing and undergraduate-level teaching skills in geology. Persuasive (proposal) writing workshop; discussions on campus teaching resources, presenting information, managing classroom dynamics, evaluating student performance. Participation in teaching program required for Ph.D. in Geology. (S/U grading only.)—F. (F.) Billen

**391. Ethical Issues in Earth Sciences (1)**

Seminar—1 hour. Prerequisite: graduate standing in Geology or consent of instructor. Reading and discussion of ethical issues arising in the earth sciences. Topics include scientific misconduct, gender equity in science, authorship of scientific papers, establishing priorities in research, and related issues. (S/U grading only.) Offered in alternate years.—S. (S.)

**396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## Earth Sciences

**See Earth and Planetary Sciences, on page 237; Environmental and Resource Sciences, on page 323; Hydrologic Sciences (A Graduate Group), on page 375; Hydrology, on page 376; and Soil Science, on page 551.**

## East Asian Languages and Cultures

(College of Letters and Science)

Michelle Yeh, Ph.D., Chairperson of the Department

**Department Office.** 211 Sproul Hall  
530-752-4999;  
<http://chinese.ucdavis.edu>;  
<http://japanese.ucdavis.edu>

**Faculty**

Chi-ning Chang, Ph.D., Professor (*Japanese*)  
Xiaomei Chen, Ph.D., Professor (*Chinese*)  
Chengzhi Chu, Ph.D., Associate Professor (*Chinese*)  
Michael Foster, Ph.D., Assistant Professor (*Japanese*)  
David Gundry, Ph.D., Assistant Professor (*Japanese*)  
Mark Halperin, Ph.D., Associate Professor (*Chinese*)  
Yuming He, Ph.D., Associate Professor (*Chinese*)  
Nobuko Koyama, Ph.D., Assistant Professor (*Japanese*)  
Joseph Sorensen, Ph.D., Associate Professor (*Japanese*)  
Sayumi Suzuki, Ph.D., Assistant Professor (*Japanese*)  
Michelle Yeh, Ph.D., Professor (*Chinese*)

**Emeriti Faculty**

Robert Borgen, Ph.D., Professor Emeritus  
Donald A. Gibbs, Ph.D., Professor Emeritus

**Affiliated Faculty**

Junko Ito, Lecturer (*Japanese*)  
Yoko Kato, Lecturer (*Japanese*)  
I-chia Lee, Lecturer (*Chinese*)  
Jiao Li, Lecturer (*Chinese*)  
Ling-Yu Lu, Lecturer (*Chinese*)  
Naoko McHale, Lecturer (*Japanese*)  
Mayumi Saito, Lecturer (*Japanese*)  
Haruko Sakakibara, Lecturer (*Japanese*)  
Miyo Uchida, Lecturer (*Japanese*)  
Moeko Watanabe, Lecturer (*Japanese*)  
Miki Wheeler, Lecturer (*Japanese*)  
Binbin Yang, Lecturer (*Chinese*)

**The Major Program**

The department offers a core language program in both Chinese and Japanese and courses in literature and culture. The core language program in Chinese has two tracks: one for students who have no background whatsoever and one for students with prior language background.

**The Program.** A student elects to major in either Japanese or Chinese. Practical language skills are taught using the most modern methods so that upon entering the upper division a student will have

attained substantial fluency in the spoken language (hearing and speaking) and the written language (reading and writing). Upper-division courses balance the need to further language skills with the need to understand and appreciate the cultural richness of either Chinese or Japanese civilization. All students are encouraged to combine their study of language and literature with courses in related fields, and to study abroad through the Education Abroad Program, the UC Davis Study Abroad Program or through internships in China and Japan.

**Career Opportunities.** UC Davis graduates have learned that a major in Chinese or Japanese is a genuine, earned distinction that facilitates entrance to graduate programs and professional schools. In addition, job opportunities abound in virtually all career paths, especially for those who have completed study abroad.

**Chinese****A.B. Major Requirements:**

<b>Preparatory Subject Matter .....</b>	<b>0-30</b>	<b>UNITS</b>
---	-------------	--------------

Chinese 1, 2, 3, 4, 5, 6; OR 1BL, 2BL, 3BL; OR 1CN, 2CN, 3CN; OR equivalent as determined by a required language placement exam.  
Recommended but NOT required: Chinese 10, 11, 50, Comparative Literature 14, Japanese 10, Linguistics 1, History 9A.

<b>Depth Subject Matter .....</b>	<b>40</b>	<b>UNITS</b>
-----------------------------------	-----------	--------------

Chinese 106, 107, 111, 112, 113, 114, 160.....28

Note: With prior approval of the undergraduate adviser, students already proficient in Chinese at any third-year level (111-112-113) must take other upper-division Chinese courses to replace language course(s).

Three\* courses (at least 12 units) selected from Chinese 100A, 101, 102, 103, 104, 105, 108, 109A-I, 110, 115, 116, 120\*\*, 130\*, 131, 132, 133\*\*, 134, 140\*\*, 150\*\* or any approved substitutions; \*one of the three courses must be from Chinese 101, 102, 103, 104, 109G.....12  
\*\*Chinese 120, 130, 133, 140 and 150 can be repeated when the contents are different.

*Recommended substitutions:* Japanese 101, 102, 103, 104, 105, 106; Anthropology 148A or 148B; Art History 163A or 163B; East Asian Studies 113; History 191A-F; Religious Studies 172; or other advanced literature and culture courses selected in consultation with the undergraduate adviser.

<b>Total Units for the Chinese Major.....</b>	<b>40-70</b>	<b>UNITS</b>
---	--------------	--------------

**Major Advisers in Chinese.** X. Chen, C. Chu, M. Halperin, Y. He, M. Yeh

**Japanese****A.B. Major Requirements:**

<b>Preparatory Subject Matter .....</b>	<b>0-30</b>	<b>UNITS</b>
---	-------------	--------------

Japanese 1, 2, 3, 4, 5, 6 OR equivalent as determined by a language placement exam.  
Recommended but NOT required:

Japanese 10, 15, 25, Chinese 10, 11, 50, Linguistics 1, History 9B.

<b>Depth Subject Matter .....</b>	<b>40</b>	<b>UNITS</b>
-----------------------------------	-----------	--------------

Japanese 101, 102, 103, 111, 112, 113, 151.....28  
Note: With prior approval of the undergraduate adviser, students already proficient in Japanese at any third-year level (111-112-113) must take other upper division Japanese courses to replace language course(s).

Three classes (at least 12 units) selected from the following: Japanese 104, 105, 106, 107, 108, 109, 114A-C, 115, 121, 122, 123, 130, 131, 132, 133, 134, 135, 136,

137, 138, 141, 152, 156, 157; Anthropology 149A, 149B; Art History 164; Chinese (up to two upper-division Chinese courses); Comparative Literature 153; Economics 171; History 194A-, 194B-, 194C; Political Science 148B; Religious Studies 170, 172; or other advanced literature and culture courses selected in consultation with the undergraduate adviser

12

**Total Units for the Japanese Major .. 40-70**

**Major Advisers in Japanese.** C. Chang, D. Gundry, N. Koyama, J. Sorensen

**Minor Program Requirements:**

Minors are offered in Chinese and in Japanese for students wishing to follow a formally recognized program of study in those languages and literatures.

UNITS

**Chinese .....** **20**

**Japanese .....** **20**

All upper division courses, including both language courses and literature in translation courses, may be used to meet this requirement. One approved lower division course (Chinese 10, 11, 50; Japanese 10, 25, 50) may also be used. In addition, students must demonstrate their language proficiency, normally through completion of Chinese 3BL or 6 or Japanese 6. Only four units from 192, 197T, 198, and 199 may be applied to the minor. For details, consult the undergraduate advisers.

**Honors Program.** Candidates for high or highest honors in Chinese or Japanese must enroll in Chinese 199 or Japanese 199 and complete a research project or a scholarly paper under the direction of a faculty member. The project will have a minimum duration of two quarters and carry a minimum of 6 units of credit. Additionally, entrance into the honors program requires completion of at least 135 units with a minimum GPA of 3.500 in courses counted toward the major. Interested students should consult with faculty in their field of interest in their junior year and undertake their project during the first two quarters of their senior year. Other arrangements must be authorized in advance by the department chair.

Students who complete the honors thesis receive departmental citation, and if their overall GPA qualifies them, may be recommended by the faculty for honors, high honors or highest honors at graduation.

**Education Abroad Program.** The university maintains study abroad programs in China, Japan, Hong Kong, and Taiwan. They offer excellent opportunities for students to polish their language skills and experience Asian cultures firsthand. Students are encouraged to participate. Appropriate courses taken abroad can be applied toward the major or the minor. For details, see the department's undergraduate adviser, the Education Abroad Program office or the UC Davis Study Abroad Office.

**Related Courses.** See East Asian Studies course list.

**Prerequisite Credit.** No student may repeat a course if that course is a prerequisite for a course that has already been completed with a grade of C- or better.

**Placement.** Chinese 1 and Japanese 1 are intended for beginning students with no prior knowledge of those languages. Students who do have some knowledge but wish to improve their skills should meet with one of the advisers to discuss appropriate placement. Students must follow departmental guidelines for placement in all language courses and instructor approval is required for enrollment.

**Backtracking.** Satisfactory completion of a language course is evidence that a student's language skills are beyond the level of those expected in its prerequisite courses. Accordingly, students who have

completed a language course cannot go back and take its prerequisites. If the prerequisite courses are required for the major, students may substitute other courses. Students who are not sure how this requirement applies to them should speak to the undergraduate adviser.

**Waived Language Courses.** Students with exceptional language ability may waive required language courses. If lower division courses have been waived, students will not have to take courses in their place. If upper division courses have been waived, students can use other appropriate courses to earn the units they need to complete the major. Consult the undergraduate adviser regarding selection of appropriate courses.

## Courses in Chinese (CHN)

### Lower Division

#### 1. Elementary Chinese (5)

Lecture/discussion—5 hours. Prerequisite: no background in Chinese or placement exam or consent of instructor. Developing elementary level skills of listening, speaking, reading and writing in Mandarin Chinese in everyday communication settings. Introduction of fundamentals of pronunciation, grammar, and Chinese characters will be introduced. GE credit: ArtHum | AH, OL, WC.—F, W, S. (F, W, S.)

#### 1A. Accelerated Intensive Elementary Chinese (15)

Lecture/discussion—15 hours. Prerequisite: no background in Chinese or placement exam or consent of instructor. Introduction and practice in contexts of pronunciation, writing system, basic grammar and vocabulary as basis of communicative competency in Mandarin Chinese within a special nine-week intensive course which combines courses 1, 2 and 3. Not open for credit to students who have completed course 1, 2, or 3. GE credit: ArtHum | AH, OL, WC.—Su. (Su.)

#### 1BL. Accelerated Written Chinese I (5)

Lecture—5 hours. Prerequisite: placement exam or consent of instructor. Trainings on all the communicative skills of listening, speaking, reading, and writing for students who already have elementary level ability to understand or speak Mandarin Chinese. Emphases on standard Mandarin pronunciation, Chinese characters, and discourse level conversations. Not open for credit to students who have completed course 8. GE credit: ArtHum | AH, OL, WC.—F. (F.)

#### 1CN. Mandarin for Cantonese Speakers I (5)

Lecture—5 hours. Prerequisite: placement exam or consent of instructor. Training in spoken Mandarin, particularly in the phonetic transcription system known as pinyin, for students who already read and write Chinese. Not open for credit to students who have completed course 7. GE credit: ArtHum | AH, OL, WC.

#### 2. Elementary Chinese (5)

Lecture/discussion—5 hours. Prerequisite: course 1 or placement exam or consent of instructor. Continuation of elementary level skill development in listening, speaking, reading and writing Mandarin Chinese in everyday communication settings. Continued introduction of basic vocabulary and characters as well as core grammar, and further train pronunciation. GE credit: ArtHum | AH, OL, WC.—F, W, S. (F, W, S.)

#### 2BL. Accelerated Written Chinese II (5)

Lecture—5 hours. Prerequisite: course 1BL or placement exam or consent of instructor. Further trainings on all the communicative skills of listening, speaking, reading, and writing for students that already have elementary level ability to understand or speak Mandarin Chinese. Emphases on standard Mandarin pronunciation, Chinese characters, and discourse level conversations. Not open for credit to students who have completed course 18. GE credit: ArtHum | AH, OL, WC.—W. (W.)

#### 2CN. Mandarin for Cantonese Speakers II (5)

Lecture—5 hours. Prerequisite: course 1CN or placement exam or consent of instructor. Continuation of course 1CN. Continuation of course 1CN. Training in spoken Mandarin for students who can already read and write Chinese. Not open for credit to students who have completed course 17. GE credit: ArtHum | AH, OL, WC.—Yeh

#### 3. Elementary Chinese (5)

Lecture/discussion—5 hours. Prerequisite: course 2 or placement exam or consent of instructor. Continuation of elementary level skill development in listening, speaking, reading and writing Mandarin Chinese in everyday communication settings. Continued introduction of basic vocabulary and characters as well as core grammar, and further train pronunciation. GE credit: ArtHum | AH, OL, WC.—F, W, S. (F, W, S.)

#### 3BL. Accelerated Written Chinese III (5)

Lecture—5 hours. Prerequisite: course 2BL or placement exam or consent of instructor. Continuation of course 2BL with further trainings on all the communicative skills of listening, speaking, reading, and writing with emphases on standard Mandarin pronunciation, Chinese characters, and discourse level conversations in more communication settings. Not open for credit to students who have completed course 28. GE credit: ArtHum | AH, OL, WC.—S. (S.)

#### 3CN. Mandarin for Cantonese Speakers III (5)

Lecture—5 hours. Prerequisite: course 2CN or placement exam or consent of instructor. Continuation of course 2CN. Prepares students for entering upper division courses in Chinese. Not open for credit to students who have completed course 27. GE credit: ArtHum | AH, OL, WC.

#### 4. Intermediate Chinese (5)

Lecture/discussion—5 hours. Prerequisite: course 3; or placement exam or consent of instructor. Continuation of intermediate-level communication skills in spoken and written Mandarin, based on language skills developed in course 3. GE credit: ArtHum | AH, OL, WC.—F, W, S. (F, W, S.)

#### 4A. Accelerated Intensive Intermediate Chinese (15)

Prerequisite: course 3 or 1A; or placement exam or consent of instructor. Special nine-week accelerated, intensive summer session course that combines the work of courses 4, 5, and 6. Intermediate-level training in spoken and written Chinese in cultural and communicative contexts, based on language skills developed in course 3 or 1A. Not open to students who have completed course 4, 5, or 6. GE credit: ArtHum | AH, OL, WC.—F. (F.)

#### 5. Intermediate Chinese (5)

Lecture/discussion—5 hours. Prerequisite: course 4; or placement exam or consent of instructor. Training continues at intermediate-level in spoken and written Chinese in cultural contexts, based on language skills developed in course 4. GE credit: ArtHum | AH, OL, WC.—W. (W.)

#### 6. Intermediate Chinese (5)

Lecture/discussion—5 hours. Prerequisite: course 5; or placement exam or consent of instructor. Intermediate-level training in spoken and written Chinese in cultural contexts, based on language skills developed in course 5. GE credit: ArtHum | AH, OL, WC.—S. (S.)

#### 7. Chinese Business Culture (4)

Lecture/discussion—4 hours. Prerequisite: consent of instructor. Open to non-heritage students who have no prior knowledge of, or background in, the Chinese language; anyone who has taken Chinese language classes before or after being enrolled at UC Davis, or anyone who is currently enrolled in a Chinese language class, or who speaks any Mandarin or Chinese dialect (e.g., Cantonese), cannot take the course for credit without the instructor's permission. Introduction to business culture of China. Basic con-

versation and Romanization of Chinese words. GE credit: ArtHum or SocSci, Div | AH or SS, OL, WC.—Yeh

#### 10. Modern Chinese Literature (In English) (4)

Lecture—3 hours; term paper or discussion—1 hour. Introductory course requiring no knowledge of Chinese language or history. Reading and discussion of short stories and novels and viewing of two films. Designed to convey a feeling for what China has experienced in the twentieth century. Not open for credits to students who have already taken, or are taking concurrently, course 104. GE credit: ArtHum, Div, Wrt | AH, WC.—Chen

#### 11. Great Books of China (in English) (4)

Lecture—3 hours; discussion—1 hour. Selected readings in English translation are supplemented with background information on periods, authors and the interrelationships of culture, literature and social change. Methods of analysis are introduced and applied in class discussions. GE credit: ArtHum, Div, Wrt | AH, WC.—Halperin

#### 50. Introduction to the Literature of China and Japan (4)

Lecture/discussion—4 hours. Methods of literary analysis and their application to major works from the various genres of Chinese and Japanese literature (in translation), including film. East Asian cultural traditions will also be introduced. (Same course as Japanese 50.) GE credit: ArtHum, Div, Wrt | AH, WC.—Gundry

#### 98. Directed Group Study (1-5)

(P/NP grading only.)

#### 99. Special Study for Undergraduates (1-5)

(P/NP grading only.)

### Upper Division

#### 100A. Chinese Intellectual Traditions: Daoist Traditions (4)

Lecture/discussion—4 hours. Prerequisite: a course in Chinese history recommended. English-language survey of key Daoist texts and scholarship. Topics include Daoist concepts of the cosmos, the natural world, scripture, the body, and immortality; Daoist deities; Daoism and the state. (Same course as Religious Studies 175A) GE credit: ArtHum, Div, Wrt | AH, WC.—Halperin

#### 100B. Confucian Traditions (4)

Lecture/discussion—4 hours. Key aspects of the Confucian tradition in dynastic China. Major themes addressed include ritual, classical studies, and Confucian influences on the Chinese family and state. GE credit: ArtHum | AH, WC.—Halperin

#### 101. Chinese Film (4)

Lecture/discussion—3 hours; film viewing—3 hours. English language survey of Chinese film, from its inception to the end of the twentieth century. Chinese films as important texts for understanding national, transnational, racial, gender, and class politics of modern China. (Same course as Cinema & Technocultural Studies 147A) GE credit: ArtHum, Div | AH, VL, WC.—Chen

#### 102. Chinese American Literature (in English) (4)

Lecture—3 hours; term paper or discussion—1 hour. English language survey of Chinese American literature which reflects cultural roots in China before immigration and the diaspora experience in the United States after immigration. Memory, nostalgia, national identities, cross-cultural communication, globalization, and trans-national politics. GE credit: ArtHum, Div, Wrt | AH, WC.—Chen

#### 103. Modern Chinese Drama (4)

Lecture—3 hours; term paper or discussion—1 hour. English language survey of modern Chinese spoken drama in the twentieth century and its major playwrights, in the context of Chinese history and the interaction of Chinese culture with other cultures. GE credit: ArtHum, Div, Wrt | AH, VL, WC.—Chen

**104. Modern Chinese Fiction (in English) (4)**

Lecture—3 hours; term paper or discussion—1 hour. English language survey of Chinese fiction as it evolved amidst the great historical, social and cultural changes of the twentieth century. Thorough study of the most influential writers and genres. GE credit: ArtHum, Div, Wrt | AH, WC.—Chen

**105. Western Influences on Twentieth-Century Chinese Literature (in English) (4)**

Lecture—3 hours; discussion—1 hour. Introduction of Western literary thought into modern China, the experimentation with Western literary forms and techniques, and the development of Marxism in contemporary literary writing. Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, WC.

**106. Chinese Poetry (in English) (4)**

Lecture—3 hours; discussion—1 hour. Organized topically and chronologically, the lyric tradition is explored from the dawn of folk songs down to modern expressions of social protest. Topics include friendship, love, oppression, war, parting, death, ecstasy and beauty. All readings are in English. GE credit: ArtHum, Div, Wrt | AH, WC.—Yeh

**109A. Topics in Chinese Literature; Crime and Punishment (in English) (4)**

Lecture—3 hours; discussion—1 hour. Topics in Chinese literature; crime and punishment. GE credit: ArtHum, Div, Wrt | AH, WC.—Chen, Halperin, Yeh

**109C. Topics in Chinese Literature; Women Writers (in English) (4)**

Lecture—3 hours; discussion—1 hour. Topics in Chinese literature; women writers. GE credit: ArtHum, Div, Wrt | AH, WC.—Chen, Halperin, Yeh

**109D. Topics in Chinese Literature; The Knight-Errant (in English) (4)**

Lecture—3 hours; discussion—1 hour. Topics in Chinese literature; the knight-errant. GE credit: ArtHum, Div, Wrt | AH, WC.—Chen, Halperin, Yeh

**109E. Topics in Chinese Literature; The City in Fiction (in English) (4)**

Lecture—3 hours; discussion—1 hour. Topics in Chinese literature; the city in fiction. GE credit: ArtHum, Div, Wrt | AH, WC.—Chen, Halperin, Yeh

**109G. Topics in Chinese Literature; The Literature of Twentieth-Century Taiwan (in English) (4)**

Lecture—3 hours; discussion—1 hour. Topics in Chinese literature; the literature of twentieth-century Taiwan. GE credit: ArtHum, Div, Wrt | AH, WC.—Chen, Halperin, Yeh

**109H. Topics in Chinese Literature; Popular Literature (in English) (4)**

Lecture—3 hours; discussion—1 hour. Topics in Chinese literature; popular literature. GE credit: ArtHum, Div, Wrt | AH, WC.—(S.) Chen, Halperin, Yeh

**109I. Topics in Chinese Literature; Scholar & The Courtesan (in English) (4)**

Lecture—3 hours; discussion—1 hour. Topics in Chinese literature; the scholar and the courtesan. GE credit: ArtHum, Div, Wrt | AH, WC.—Chen, Halperin, Yeh

**110. Great Writers of China: Texts and Context (in English) (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Examination of major theoretical concepts and interpretive methods in the study of literature by using examples from the Chinese tradition; discussions of classical and modern works with an emphasis on the relations between literature, author, society, and culture. GE credit: ArtHum, Div, Wrt | AH, WC.—Yeh, He

**111. Modern Chinese: Reading and Discussion (12)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or placement exam or consent of instructor. Building on Chinese 6/3BL, further development of communication skills in Modern Standard Mandarin-speaking environments. Reading of dialogues/articles pertaining to contemporary China. GE credit: ArtHum | AH, OL, WC.—F. (F.)

**111A. Intensive Third-Year Chinese (12)**

Lecture/discussion—13.3 hours. Prerequisite: Not open to students who have completed course 111, 112, or 113. Nine-week intensive summer course combines courses 111, 112, and 113. Training at intermediate-high and advanced-low level in spoken and written Chinese in cultural and communicative contexts based on language skills developed in course 6. GE credit: ArtHum | AH, OL, WC.—He, (Su.)

**112. Modern Chinese: Reading and Discussion (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 111 or placement exam or consent of instructor. Continuation of course 111. Further development of communication skills in Modern Standard Mandarin-speaking environments. Reading dialogues/articles pertaining to contemporary China issues and discuss ethical, moral, aesthetic, social, and cultural concerns. Studying strategies for moving between simplified and traditional Chinese characters. GE credit: ArtHum | AH, OL, WC.—W. (W.)

**113. Modern Chinese: Reading and Discussion (4)**

Lecture—3 course 112 or placement exam or consent of instructor 112. Continuation of course 112, further developing communication skills in Modern Standard Mandarin-speaking environments. Read dialogues/articles pertaining to contemporary China issues and discuss ethical, moral, aesthetic, social, and cultural concerns. Study strategies for moving between simplified and traditional Chinese characters. GE credit: ArtHum | AH, OL, WC.—S. (S.)

**114. Introduction to Classical Chinese (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 112 or equivalent language proficiency; consent of instructor. Introduction to the language in which, until the twentieth century, most official, documentary, scholarly, and belle-lettistic Chinese literature was written. GE credit: ArtHum | AH, WC.—F, S. (F, S.) Halperin, He

**115. Introduction to Classical Chinese II (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 114 or consent of instructor. Continuation of enhancing classical Chinese reading skills with literature ranging from the prose found in Han dynasty historical works, Six Dynasties anecdotal literature, and Tang occasional texts, as well as the poetic shi and fu genres. GE credit: ArtHum | AH, WC.—Halperin, He

**116. Introduction to Classical Chinese III (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 115 or consent of instructor. Translations of extended readings in the original sources and brief analyses of syntax. These sources will include texts written by well-known figures from the eighth through fifteenth centuries, composing in a wide variety of genres. GE credit: ArtHum | AH, WC.—Halperin, He

**120. Advanced Chinese (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or placement exam or consent of instructor. Evaluation of readings from various genres (literature, newspapers, TV and movies, etc.) develop advanced reading, writing, aural comprehension, and formal/professional speech skills in Mandarin Chinese. Chinese society/cultural studies, especially those sociocultural issues reflected in the language used in learning materials. May be repeated one time for credit. Course material is different for each quarter of an academic year. Students may repeat course one time but repeat class cannot be for the same quarter taken in a previous academic year. GE credit: ArtHum | AH, OL, WC.—F, W, S. (F, W, S.)

**130. Readings in Traditional Chinese Fiction (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 111 or equivalent language proficiency. Examination of representative works of traditional Chinese fiction popular from the 12th Century until

the 17th and 18th centuries. Translations in English of the Chinese texts will be available to students as reference. May be repeated one time for credit. GE credit: ArtHum | AH, VL, WC.—He

**131. Readings in Traditional Chinese Poetry (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 111 or equivalent language proficiency; consent of instructor. Traditional Chinese poetry from its beginnings to the golden ages of Tang and Song, surveying forms and poets that best reveal the Chinese poetic sensibility and the genius of the language of Chinese poetry. GE credit: ArtHum | AH.—Yeh

**132. Readings in Modern Chinese Poetry (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 111 or equivalent language proficiency; consent of instructor. Chinese poetry from the Literary Revolution of 1917 to the present, surveying works that embody exciting innovations and reflect the modernity of twentieth-century Chinese society and culture. GE credit: ArtHum | AH, WC.—Yeh

**133. Readings in Modern Chinese Prose and Drama (4)**

Lecture—4 hours. Prerequisite: course 111 or equivalent language proficiency. Literary works and scholarly essays on selected topics of Chinese prose and drama, development of a deep understanding of Chinese culture and society through sophisticated reading materials of these two important genres of the modern period. Conducted in Chinese. May be repeated two times for credit when topic differs. GE credit: ArtHum | AH, WC.—Chen

**134. Chinese Film in Chinese Language (4)**

Lecture—3 hours; film viewing—3 hours. Prerequisite: course 111 or equivalent language proficiency. Chinese placement exam. Chinese film and scholarly essays on Chinese cinema and film history. Develop a deep understanding of Chinese culture and society through viewing and studying Chinese films in the Chinese language. GE credit: ArtHum or SocSci | AH or SS, OL, VL, WC.—Chen

**140. Readings in Classical Chinese (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Study and philological analysis of selected texts from the first millennium of Imperial China. May be repeated two times for credit. GE credit: ArtHum | AH.—He

**150. Fifth-Year Chinese: Selected Topics in Chinese Language, Literature, and Culture (4)**

Lecture/discussion—4 hours. Prerequisite: course 120 or placement exam or consent of instructor. Examination of literary works and scholarly essays on selected topics of Chinese culture and society. Development of a deep understanding of Chinese culture and society through sophisticated Chinese speaking and writing exercises. May be repeated three times for credit when topic differs. Offered irregularly. GE credit: ArtHum, Div, Wrt | AH, OL, WC, WE.—Chu, He, Yeh

**160. The Chinese Language (4)**

Lecture/discussion—4 hours. Prerequisite: course 6 or 3BL or 3CN or 4A (can be concurrent) or placement exam or consent of instructor; Linguistics 1 recommended. Evaluation of the Chinese language viewed in its linguistic context, synchronically and diachronically. Historical phonology, classical and literary language, rise of written vernacular, descriptive grammar of modern standard Chinese, dialectal variation, and sociolinguistic factors. GE credit: ArtHum | AH, WC.—Chu

**192. Chinese Internship (1-12)**

Internship—3-36 hours to be arranged. Prerequisite: upper division standing and consent of instructor. Work experience in the Chinese language, with analytical term paper on a topic approved by instructor. (P/NP grading only.)

**194H. Special Study for Honors Students (1-5)**

Independent study—3-15 hours. Prerequisite: senior standing and qualification for the Chinese honors program; consent of instructor. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in Chinese literature, civilization, or language studies. May be repeated up to eight units for credit. (P/NP grading only.) GE credit: ArtHum | AH, WC, WE.—F, W, S. (F, W, S.)

**197T. Tutoring in Chinese (1-4)**

Tutoring—1-4 hours. Prerequisite: consent of Department. Leading of small voluntary discussion groups affiliated with one of the Department's regular courses. May be repeated up to four units for credit. (P/NP grading only.)—Chu

**198. Directed Group Study (1-5)**

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.)

**Graduate****299. Research (1-12)**

(S/U grading only.)

**Professional****396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: consent of instructor; graduate standing. Any course taught by a graduate student under the direction of the Director. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.) Chu

**Courses in Japanese (JPN)****Lower Division****1. Elementary Japanese (5)**

Lecture/discussion—5 hours. Introduction to spoken and written Japanese in cultural contexts, with emphasis on communication. GE credit: ArtHum | AH, OL, WC.—F. (F.)

**1A. Accelerated Intensive Elementary Japanese (15)**

Lecture/discussion—15 hours. Special 12 week accelerated, intensive summer session course that combines the work of courses 1, 2 and 3. Introduction to Japanese grammar and development of all language skills in cultural context with emphasis on communication. Not open for credit to students who have completed course 1, 2, or 3. GE credit: ArtHum | AH, OL, WC—Su.

**1AS. Intensive Elementary Japanese (15)**

Lecture/discussion—15 hours. Intensive course taught combining the work of courses 1, 2 and 3. Introduction to Japanese grammar and development of all language skills in a cultural context with emphasis on communication. Offered in Japan. Not open for credit to students who have taken course 1, 2, or 3. GE credit: ArtHum | AH, OL, WC—Su. (Su.)

**2. Elementary Japanese (5)**

Lecture/discussion—5 hours. Prerequisite: successful completion (C- or better) of course 1 or the equivalent language proficiency. Continuation of training in basic Japanese spoken and written skills. GE credit: ArtHum | AH, OL, WC—W. (W.)

**3. Elementary Japanese (5)**

Lecture/discussion—5 hours. Prerequisite: successful completion (C- or better) of course 2 or equivalent language proficiency. Continuation of training in basic spoken and written skills in Japanese language. GE credit: ArtHum | AH, OL, WC—S. (S.)

**4. Intermediate Japanese (5)**

Lecture/discussion—5 hours. Prerequisite: successful completion (C- or better) of course 3 or the equivalent language proficiency. Intermediate-level training in spoken and written Japanese in cultural context, based on language skills developed in course 3. GE credit: ArtHum | AH, OL, WC—F. (F.)

**5. Intermediate Japanese (5)**

Lecture/discussion—5 hours. Prerequisite: successful completion (C- or better) of course 4 or the equivalent language proficiency. Intermediate-level training in spoken and written Japanese in cultural context, based on language skills developed in course 4. GE credit: ArtHum | AH, OL, WC—W. (W.)

**6. Intermediate Japanese (5)**

Lecture/discussion—5 hours. Prerequisite: successful completion (C- or better) of course 5 or the equivalent language proficiency. Intermediate-level training in spoken and written Japanese in cultural context, based on language skills developed in course 5. GE credit: ArtHum | AH, OL, WC—S. (S.)

**7S. Intensive Intermediate Japanese (20)**

Lecture/discussion—20 hours. Prerequisite: course 2. Not open for students who have taken course 3, 4, 5, or 6; an exception can be made for students who have taken course 3 or its equivalent, provided that those five units are deducted from the 20 total unit load. Special intensive course that combines the work of courses 3, 4, 5, and 6. Introduction to Japanese grammar and development of all language skills in a cultural context with emphasis on communication. Taught in Japan. GE credit: ArtHum | AH, OL, WC—S. (S.)

**10. Masterworks of Japanese Literature (in English) (4)**

Lecture—3 hours; discussion—1 hour. Introduction to Japanese literature: readings and discussion in English of important works from earliest times to the present. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Sorensen

**15S. Introduction to Japanese Culture (2)**

Lecture/discussion—2 hours; fieldwork. Restricted to students enrolled in units for the Kyoto Quarter Abroad program. Aspects of Japanese culture: literature, history, religion, art, language, and society. Conducted in English; taught in Japan. (P/NP grading only) GE credit: ArtHum | AH, WC—S. (S.) Sorensen

**25. Japanese Language and Culture (in English) (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Linguistics 1 or Anthropology 4 recommended. Classification and communication of experience in Japanese culture; principles of language use in Japanese society. Speech levels and honorific language, language and gender, minority languages, literacy. Role of Japanese in artificial intelligence and computer science. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE—Koyama

**31. Basic Kanji (4)**

Lecture—3 hours; practice—1 hour. Prerequisite: successful completion (C- or better) of course 1 or equivalent proficiency of basic writing system (Hiragana and Katakana) or consent of instructor. Restricted to students who have never been exposed to any form of Kanji or Chinese characters before; students who have completed schooling up to the 6th grade in the Japanese education system or equivalent or whose native languages have Chinese character orthography are not allowed to register this course. Introduction and mastery of 300 basic Kanji or Chinese characters to establish a solid foundation in the novel and complex Kanji encountered while learning Japanese. GE credit: ArtHum | AH, WC—Koyama

**50. Introduction to the Literature of China and Japan (4)**

Lecture/discussion—4 hours. Methods of literary analysis and their application to major works from the various genres of Chinese and Japanese literature (in translation), including film. East Asian cultural traditions will also be introduced. (Same course as Chinese 50.) GE credit: ArtHum, Div, Wrt | AH, WC—Gundry

**98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) GE credit: AH—F, W, S. (F, W, S.)

**99. Special Study for Undergraduates (1-5)**

(P/NP grading only.)

**Upper Division****101. Japanese Literature in Translation: The Early Period (4)**

Lecture—3 hours; discussion—1 hour. Study of early Japanese literature from the Nara to the end of the Heian period through a broad survey of the major literary genres such as lyric poetry, court diaries, prose narratives, poem-tales, and classical Chinese writings. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—F. (F.) Gundry

**102. Japanese Literature in Translation: The Middle Period (4)**

Lecture—3 hours; discussion—1 hour. Study of the major literary genres from the twelfth century to the second half of the nineteenth century including poetry, linked-verse, military chronicles, no drama, Buddhist literature, haiku, haibun, kabuki, bunraku, plays and Edo prose narratives. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—W. (W.) Sorensen

**103. Japanese Literature in Translation: The Modern Period (4)**

Lecture—3 hours; discussion—1 hour. Modern Japanese literature from the 1870s to the 1970s. Surveys representative literary works and ideas against the social and intellectual background of the Meiji, Taisho, and Showa periods. GE credit: ArtHum, Div, Wrt | AH, WC.—S. (S.) Chang

**104. Modern Japanese Literature: War and Revolution (3)**

Lecture/discussion—3 hours. Perspectives and sensibilities with which major modern Japanese writers have interpreted the traumatic and often poignant experiences of war and socio-political upheavals from the late nineteenth century to the 1970s. Lectures, discussions, and readings in English. Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, WC.—Chang

**105. Modern Japanese Literature: Hero and Anti-hero (4)**

Lecture/discussion—4 hours. The ways in which representative hero and anti-hero protagonists in modern Japanese literature perceive, confront, challenge, and resolve a wide array of social, political, and moral problems of their times. Course taught in English. GE credit: ArtHum, Div, Wrt | AH, WC.—Chang

**106. Japanese Culture Through Film (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: consent of instructor. Aspects of Japanese culture such as love, sexuality, war, the military, the family, the position of women, growing up and death as portrayed in Japanese cinema. Lectures, discussion, and readings in English. Films with English subtitles. GE credit: ArtHum, Div, Wrt | AH, WC—Chang, Gundry

**107. Modern Japanese Autobiographies (in English) (4)**

Lecture—3 hours; term paper/discussion—1 hour. Exploring the modern and contemporary Japanese social and cultural landscape through critical analysis of modern Japanese autobiographies by prominent and other authors in the 19th and 20th centuries. Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, WC—F. (F.) Chang

**108. Poetry of China and Japan (in English) (4)**

Lecture—3 hours; discussion—1 hour. A comparative approach to Chinese and Japanese poetry, examining poetic practice in the two cultures; includes a general outline of the two traditions, plus study of poetic forms, techniques, and distinct treatments of universal themes: love, nature, war, etc. (Same course as Chinese 108.) GE credit: ArtHum, Div, Wrt | AH, WC.

**109. Japanese Popular Culture (5)**

Lecture—3 hours; discussion—1 hour; film viewing—3 hours. Japanese popular culture, from its medieval/early modern precedents to contemporary incarnations. Emphasis on the major forms of twentieth-century popular culture, including genre films,

popular theater, TV manga (cartoons), animation and science fiction. GE credit: ArtHum, Div | AH, VL, WC.

### **111. Modern Japanese: Reading and Discussion (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: successful completion (C- or better) of course 6 or the equivalent language proficiency. Readings in modern Japanese short stories, newspaper articles, and essays; conversation practice based on these readings. GE credit: ArtHum | AH, OL.—F. (F.)

### **112. Modern Japanese: Reading and Discussion (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: successful completion (C- or better) of course 111 or equivalent language proficiency. Continuation of course 111. GE credit: ArtHum | AH, OL, WC.—W. (W.)

### **113. Modern Japanese: Reading and Discussion (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: successful completion (C- or better) of course 112 or equivalent language proficiency. Continuation of course 112. GE credit: ArtHum | AH, OL, WC.—S. (S.)

### **114A. Spoken Japanese (2)**

Discussion—2 hours. Prerequisite: successful completion (C- or better) of course 6 or equivalent language proficiency. Training in spoken Japanese for students with a basic working knowledge of the language. (P/NP grading only.) GE credit: OL.

### **114B. Spoken Japanese (2)**

Discussion—2 hours. Prerequisite: successful completion (C- or better) of course 114A or equivalent language proficiency or consent of instructor. Continuation of course 114A. Training in spoken Japanese for students with a basic working knowledge of the language. (P/NP grading only.) GE credit: OL.

### **114C. Spoken Japanese (2)**

Discussion—2 hours. Prerequisite: successful completion (C- or better) of course 114B or equivalent language proficiency or consent of instructor. Continuation of course 114B. Training in spoken Japanese for students with a basic working knowledge of the language. (P/NP grading only.) GE credit: OL.

### **115. Japanese Composition (2)**

Lecture—2 hours. Prerequisite: successful completion (C- or better) of course 6 or consent of instructor. Development of skills in the techniques of writing Japanese. Practice in short essay writing with an aim toward mastery of the vocabulary and syntax of written style Japanese.—F. (F.)

### **117S. Intensive Modern Japanese: Reading and Discussion (17)**

Lecture/discussion—17 hours. Prerequisite: course 5. Introduction to basic Japanese grammar and development of more advanced reading, writing, and conversation skills in a cultural context. Combination of courses 6, 111, 112, and 113 taught intensively in Japan. Not open to students who have taken courses 6, 111, 112, or 113; an exception can be made for students who have taken course 6 or its equivalent, provided that those five units are deducted from the 17 total unit load. GE credit: ArtHum | AH, OL, WC.

### **121. Advanced Japanese I (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: successful completion (C- or better) of course 113 or consent of instructor. First of three courses in a series of fourth year Advanced Japanese which focuses on the levels of formality or politeness in conversation as well as sociocultural aspects and topics in the Japanese society. GE credit: ArtHum | AH, OL, WC, WE.—Koyama

### **122. Advanced Japanese II (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: successful completion (C- or better) of course 121 or consent of instructor. Second of three courses in a

series of fourth-year Advanced Japanese which focuses on the levels of formality or politeness in conversation as well as socio-cultural aspects and topics in the Japanese society. GE credit: ArtHum | AH, OL, WC, WE.—W. (W.) Koyama

### **123. Advanced Japanese III (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: successful completion (C- or better) in course 122 or consent of instructor. Third of three courses in a series of 4th year Advanced Japanese which focuses on the levels of formality or politeness in conversation as well as socio-cultural aspects and topics in the Japanese society. GE credit: ArtHum | AH, OL, WC, WE.—S. (S.) Koyama

### **130. Readings in Modern Japanese Literature to 1926 (4)**

Lecture/discussion—4 hours. Prerequisite: course 113. Restricted to completion of course 113 or equivalent as determined by taking a placement exam or consent of instructor. Short stories and essays by Japanese writers of the Meiji and Taishō eras, from 1868 to 1926. Authors include Natsume Sōseki, Izumi Kyōka, Tanizaki Jun'ichirō and Akutagawa Ryūnosuke. Readings and discussion in Japanese with some emphasis on translation into English. GE credit: ArtHum | AH, WC.—Sorensen

### **131. Readings in Modern Japanese Literature: 1920-1945 (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or the equivalent language proficiency. Fourth-year level reading of representative works of modern Japanese literature including short stories, novellas, diaries, memoirs, poetry and excerpts from novels and plays from 1920 through the militaristic era, to the end of the war years in 1945. GE credit: ArtHum | AH.—Chang, Gundry

### **132. Readings in Modern Japanese Literature: 1945-1970 (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or the equivalent language proficiency. Continuation of course 131, but may be taken independently. Covers selected texts from the immediate post-war years beginning in 1945 down to 1970 and the post-war recovery. GE credit: ArtHum | AH.—Chang

### **133. Readings in Modern Japanese Literature: 1970 to Present (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or the equivalent language proficiency. Continuation of course 132, but may be taken independently. Covers selected texts from 1970 to the present. Offered in alternate years. GE credit: ArtHum | AH, WC.—Chang

### **134. Readings in the Humanities: Traditional Culture (4)**

Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: course 113 or the equivalent language proficiency. Fourth-year level reading of modern works by major specialists on traditional Japanese culture: history, religion, thought, art, international relations, and literary history and criticism. Focus is equally on developing reading skills and learning about Japanese culture. GE credit: ArtHum | AH, WC.—Sorensen

### **135. Readings in the Humanities: The Modern Period (4)**

Lecture—3 hours; term paper. Prerequisite: course 113 or equivalent language proficiency. Fourth-year level reading of authentic modern writings on Japanese culture, history, philosophy, society, religion, law, politics, international relations, aesthetics, and comparative culture by prominent critics, commentators, and scholars. GE credit: AH, WC.—Chang

### **136. Readings in Newspapers and Magazines (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or the equivalent language proficiency. Fourth-year level reading of newspaper and magazine reports, articles, and editorials on domestic and international affairs relating to contemporary Japan. GE credit: ArtHum | AH, WC.—Chang

### **137. Readings in Contemporary Japanese Literature (4)**

Lecture/discussion—4 hours. Prerequisite: course 113 or equivalent language proficiency. Readings of short stories and essays by contemporary writers. Representative writers include Yoshimoto Banana, Otsuchi, Suzuki Koji, Kyogoku Natsumi, Ogawa Yoko, and Murakami Haruki. Readings and discussion in Japanese with some emphasis on translation into English. GE credit: AH, WC.—Sorensen

### **138. Readings in the Humanities: Japan Today (4)**

Lecture/discussion—4 hours. Prerequisite: course 113. Restricted to completion of course 113 or equivalent as determined by taking a placement exam or consent of instructor. Topical essays focused on contemporary Japan. Themes center on defining Japan today in terms of its future and its past such as through its urban society, trends in architecture, "soft power" industries, and "traditional" elements as mainstays of Japan's cultural currency. GE credit: ArtHum | AH, WC.—Sorensen

### **141. Introduction to Classical Japanese (4)**

Lecture/discussion—4 hours. Prerequisite: course 113 or equivalent language proficiency. The basic features of classical Japanese grammar through careful reading of selected literary texts such as Hojoki or Tsurezuregusa.—Sorensen

### **151. Japanese Linguistics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 3 or equivalent language proficiency. Introduction to Japanese linguistics, featuring key aspects of the Japanese language. Analysis of Japanese from the perspectives of phonology, syntax, discourse analysis, sociolinguistics and psycholinguistics. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Koyama

### **152. Traditional Japanese Drama (4)**

Lecture—3 hours; discussion—1 hour. Survey in English of Japanese drama, focusing on traditional forms: noh, kyōgen, bunraku puppet theater, and kabuki, with some attention to modern theater. Texts of plays and secondary works on performance techniques and the composition of plays. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.—Sorensen

### **153. Love, Sexuality and the Family in Modern Japanese Literature (4)**

Lecture—3 hours; discussion—1 hour. Modern Japanese literature from the late 19th century to the present with a focus on love and sexuality in various forms, particularly as understood through the evolving institution of the Japanese family. Lectures, readings and discussions in English. GE credit: AH, WC, WE.—W. (W.)

### **154. Tourism and Heritage in Japan (4)**

Lecture—3 hours; discussion—1 hour. Focus on related concepts of tourism and cultural heritage within Japan, with attention to questions of tradition, authenticity and nostalgia. Examination of cultural heritage sites on various scales, including built environment, national cultural forms, and local performances such as festivals. GE credit: AH, WC, WE.—S. (S.)

### **155. Introduction to Japanese Folklore (4)**

Lecture—3 hours; discussion—1 hour. Focus on narrative genres of myth, legend, and folktale, with additional attention paid to festivals, folk art, belief systems, and the development of folklore studies (minzokugaku) as an academic discipline. Examination of the relationship of folklore to ethnic and national identity. GE credit: AH, WC, WE.—W. (W.)

### **156. Japanese Literature on Film (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Survey of films based on works of Japanese literature, emphasis on pre-modern and early modern texts. Introduction to major directors of Japan, with a focus on cinematic adaptation. Lectures and readings in English. Films in Japanese with English subtitles. (Same course as Cinema and Technocultural Studies 148B.) Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.—(S.) Sorensen

**157. Japanese Women Writers (4)**

Lecture/discussion—4 hours. Survey of women writers from earliest times to the present. Genres include poetry, narrative fiction, diaries, short stories, novels, and film. Representative authors include Murasaki Shikibu, Sei Shônagon, Higuchi Ichijo, Enchi Fumiko and Ogawa Yôko. Readings and discussion in English. GE credit: ArtHum | AH, WC, WE.—F, W. Sorensen

**158. The Supernatural in Japan (4)**

Lecture/Discussion—3 hours; Film Viewing—3 hours. Depictions of the supernatural in Japanese history through the contemporary era. Overview of Japanese literary and visual arts and the socio-historical contexts of the supernatural. Lectures and readings in English. Films in Japanese with English subtitles. Offered irregularly. GE credit: ArtHum | AH, VL, WC.—Sorensen

**192. Japanese Internship (1-12)**

Internship—3-36 hours to be arranged. Work experience in Japanese language, with analytical term paper on a topic approved by instructor. (P/NP grading only.)—F, W, S. (F, W, S.)

**194H. Special Study for Honors Students (1-5)**

Independent Study—3-15 hours. Prerequisite: senior standing and qualification for the Japanese honors program; consent of instructor. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in Japanese literature, civilization, or language studies. May be repeated up to eight units for credit. (P/NP grading only.) GE credit: ArtHum | AH, WC, WE.—F, W, S. (F, W, S.)

**197T. Tutoring in Japanese (1-5)**

Tutoring—1-5 hours. Prerequisite: consent of Department chairperson. Leading of small voluntary discussion groups affiliated with one of the Program's regular courses. May be repeated for credit, but only 2 units may be applied to the minor. (P/NP grading only.)

**198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) GE credit: AH, WC.—F, W, S. (F, W, S.)

**199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.) GE credit: AH, WC.

**Graduate****291. Seminar in Modern Japanese Literature: Major Writers (4)**

Seminar—4 hours. Prerequisite: one of courses 130, 131, 132, 133, 134, 135, 136, 137, 138 or equivalent language proficiency. In-depth reading and critical analyses of major works by and critical literature on one or two prominent modern or contemporary writers such as Natsume Soseki, Mori Ogai, Shimazaki Toson, Akutagawa Ryunosuke, Tanizaki Junichiro, Abe Kobo and Oe Kenzaburo. Offered in alternate years.—S. Chang

**299. Research (1-12)**

Prerequisite: consent of instructor. (S/U grading only.)

**East Asian Studies**

(College of Letters and Science)

Katharine Burnett, Ph.D., Program Director

**Program Office.** 1277 Social Science and Humanities Building; 530-752-3406;  
<http://eastasian.ucdavis.edu>

**Committee in Charge**

Katharine Burnett, Ph.D., Associate Professor  
(*Art History*)

Beverly Bossler, Ph.D., Professor (*History*)

David Gundry, Ph.D., Assistant Professor

(*East Asian Languages & Cultures*)

Kyu Hyun Kim, Ph.D., Associate Professor (*History*)  
Sheldon Lu, Ph.D., Professor (*Comparative Literature*)  
Ethan Scheiner, Ph.D., Professor (*Political Science*)  
Xiaoling Shu, Ph.D., Professor (*Sociology*)

Eddy U, Ph.D., Associate Professor (*Sociology*)  
Li Zhang, Ph.D., Professor (*Anthropology*)

**The Major Program**

The East Asian Studies major gives the student an understanding of East Asia and Southeast Asia through interdisciplinary studies, including courses on East Asian countries within the humanities and social sciences. Students are encouraged to pursue study abroad opportunities, as well as other guided studies pertaining to East and Southeast Asia.

**The Program.** The program offers core courses in East Asian humanities and social sciences, including history, comparative literature, languages, philosophy and religion, political science, sociology, as well as courses focused on Southeast Asia. Science courses that closely engage the student of East and/or Southeast Asia are also eligible to count towards the major.

Along with taking the lower division and upper division depth subject courses; the student may choose additional courses that concentrate on a special field of interest, such as anthropology or history, or special courses such as honor thesis, independent study, internships, and study abroad.

**Programs, Internships, and Career Alternatives.** To enhance the student's understanding of East and Southeast Asia, our majors are strongly encouraged to participate in UC Davis's Study Abroad Program, which gives students the opportunity to live and experience a culture within East or Southeast Asia. Our majors are also encouraged to work with UC Davis's Internship and Career Center, which provides customized assistance for EAS students to obtain legislative, legal, and business internships and careers. Likewise, the UC Davis Sacramento and Washington Centers arrange internships and run full-credit academic programs in Sacramento and Washington D.C., with a wide range of opportunities for our majors. Graduating EAS majors are prepared for employment in government agencies (such as Foreign Service), state agencies, international or non-governmental organizations (NGO, such as the United Nations), foundations, journalism, teaching, counseling, and companies with international business interests, trade, or finance. The broad-based and multidisciplinary components of this major program enhance career prospects in jobs that demand knowledge of cultures of East and Southeast Asia.

**A.B. Major Requirements:****UNITS Preparatory Subject Matter.....21-22**

History 9A and 9B .....	8
One course from: Art History 1D, Chinese 7, 10, 11, Comparative Literature 53A, East Asian Studies 88, Japanese 10, 25, 50, Religious Studies, 75 .....	3-4
Two courses (or the equivalent) of Chinese, Japanese, or other East Asian language study (Chinese 12; Japanese 1-2) .....	10

**Depth Subject Matter .....24**

Choose 24 units from the following courses: Anthropology 134, 137, 143A, 148A, 148B, 149A, 149B; Art History 163A, 163B, 163C, 164, 190F, 190G; Chinese 100A, 100B, 101, 102, 103, 104, 105, 106, 107, 108, 109A; Community and Regional Development 153A; Comparative Literature 110, 153; Design 142A; Dramatic Art 144A, 144B, 144C, 154; East Asian Studies 113; 190; Economics 171; History 102G; 102H; 102N; 191A-J; 194A-E, 195B; Japanese 101, 102, 103, 104, 105, 106, 107, 108, 109, 152, 156, 157; Music 129C; Political Science 148B; Religious Studies 165; 170, 172, 175A; Sociology 147, 188.

**Elective Requirement.....16**

Choose 16 units from the following:  
Any East Asian Studies special course  
(Approved courses: East Asian Studies 190,

192, 194H, 196A-B, 198 - maximum 12 units from this list); Any Chinese or Japanese upper division course; Any Depth Subject Course; Any upper division Education Abroad course focusing on East Asia or Southeast Asian.

**Total Units for the Major .....61-62****Minor Program Requirements:**

Courses taken for the minor are expected to reflect a predominant interest in East Asia or Southeast Asia. All upper division courses counting towards the East Asian Studies major, may be used to fulfill the requirements for the minor program, as long as they deal predominantly with East Asia or Southeast Asia.

UNITS

**East Asian Studies.....20**

Choose any five upper division courses from the Depth Subject list for the major, or from the following list: Any Chinese or Japanese Upper Division Course; Any East Asian Studies special course (Approved: East Asian Studies 190, 192, 194H, 196A/B, 198); Study Abroad Upper Division courses focusing on East or Southeast Asia .....20

**Courses in East Asian Studies (EAS)****Lower Division****88. Korean Society: Late 19th Century to the Present (4)**

Lecture/discussion—4 hours. Modern Korean society (late 19th Century to contemporary period), emphasizing the perseverance and transformations of traditional social and cultural patterns. GE credit: ArtHum, Div, Wrt.—W. Kim

**Upper Division****113. Cinema and Society in China (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: one course from History 190C, 193, or consent of instructor. Knowledge of Chinese not required. Viewing and analysis of one Chinese film with English subtitles each week, followed by discussion and short essays. Cinematic technique, social values and film topics from 1930s to today. Not open for credit to students who have completed Chinese 113. GE credit: ArtHum, Div, Wrt.—S. (S.)

**190. East Asian Studies Seminar (4)**

Seminar—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Political, social, cultural, and economic issues in East Asia. Topic varies each year. May be repeated for credit if topic differs. Offered irregularly.

**192. East Asian Studies Internship (1-12)**

Internship—3-36 hours; term paper. Prerequisite: upper division standing and consent of instructor. Work experience in the East Asian Studies field, with analytical term paper on a topic approved by the instructor. (P/NP grading only.)

**194H. Special Study for Honors Students (1-5)**

Independent study—1-5 hours. Prerequisite: open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in East Asian Studies culture, society, or language. (P/NP grading only.)

**196A. Honors Seminar (4)**

Seminar—2 hours; conference—2 hours. Prerequisite: GPA of 3.500 in the major; senior standing; consent of instructor. A two-quarter research project culminating in an Honors thesis. A grade of B or higher must be earned to qualify the student for honors distinction at graduation. (Deferred grading only, pending completion of sequence.)—F. (F.)

**196B. Honors Seminar (4)**

Seminar—2 hours; conference—2 hours. Prerequisite: GPA of 3.500 in the major; senior standing; consent of instructor. A two-quarter research project culminating in an Honors thesis. A grade of B or

higher must be earned to qualify the student for honors distinction at graduation. (Deferred grading only, pending completion of sequence.)—W. (W.)

### 198. Directed Group Study (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

## Ecological Management and Restoration

(College of Agricultural and Environmental Sciences)

**Faculty.** See *Plant Sciences*, on page 514.

### The Major Program

This major is designed for students who are interested in understanding how to manage and restore wildland and rangeland plant communities. Courses are selected to provide an interdisciplinary background that encompasses ecology, applied plant biology, and the social sciences. Students will acquire a core understanding of natural and managed ecosystems and how they function, interact with the natural environment, are connected with human society and social change, and are restored and managed.

**The Program.** The curriculum provides depth in the ecological and botanical sciences directed toward an integrated understanding of how communities and ecosystems function and how this knowledge can assist in their management and restoration. Courses in environmental policy and law expose the students to the social drivers and constraints of ecosystem management. All students gain practical experience through practical field courses and a required internship. Students may also pursue an Honors thesis in their senior year.

**Career Alternatives.** Graduates from this program are prepared to pursue a wide range of careers, including positions in ecological restoration and ecosystem management; rangeland and reserve management; environmental consulting; public, private, or non-profit agencies concerned with restoration and natural resource management; Cooperative Extension; teaching; information and communication services. Graduates are qualified to pursue advanced studies in fields such as ecology, agroecology, environmental studies, geography or weed science.

### B.S. Major Requirements:

UNITS

#### Preparatory Subject Matter.....49-58

Biological Sciences 2A, 2B, 2C .....	15
Chemistry 2A, 2B.....	10
Physics 1A, 1B or Physics 7A, 7B, 7C .....	6-12
Mathematics 16A, 16B or Mathematics 17A, 17B or Mathematics 21A, 21B.....	6-8
Plant Sciences 120.....	4
Soil Science 100.....	5
Plant Sciences 101 or Environmental Science and Policy 1 .....	3-4

#### Depth Subject Matter .....54-69

Environmental Horticulture 160, 160L.....	4
Soil Science 102 or 105 or 111 or 118 or 120 .....	3-5
Two ecology courses chosen from: Environmental Science and Policy 155, Plant Biology 117, Plant Sciences 131, 144, 147 Wildlife, Fish, and Conservation Biology 156, 157 .....	5-8
Evolution and Ecology 100 or Plant Biology 102 or 116.....	4-5
Plant Sciences 152 or Environmental Horticulture 150.....	3-4
Four restoration/conservation courses chosen from: Plant Sciences 130, 135, 150, Environmental Science and Management 141,	

Environmental Science and Policy 127, 155L, Wildlife, Fish, and Conservation Biology 154, 155, 155L .....	11-16
Plant Sciences 176 .....	4
Environmental Science and Management 100, Hydrology 143, 147, or 151 .....	3-4
Plant Sciences 171 or Environmental Horticulture 120.....	3-4
Plant Sciences 100C Landscape Architecture 180F or Plant Sciences 163 .....	3
Plant Biology 111 or Plant Sciences 100A .....	3-4
Environmental Science and Policy 160 or 161 or 171 or 172 or 179 .....	4-5
Internship: Plant Sciences 192 or 164, must be selected in consultation with master adviser .....	2
In addition to the required coursework listed above, students might consider taking some of the following courses: Entomology 107, Hydrology 124, Landscape Architecture 150, Plant Sciences, 158, 135, 141 and 162, Science and Society 18, and Soil Science 109	

#### Total Units for the Major .....103-127

##### Major Adviser. T.P. Young

**Advising Center** for the major, including peer advising, is located in 1220 Plant and Environmental Sciences 530-752-1715.

## Ecology (A Graduate Group)

Edwin Grosholz, Ph.D., Chairperson of the Group

**Group Office.** 1005 Wickson Hall  
530-752-6752; <http://ecology.ucdavis.edu>

### Faculty

Gwen Arnold, Ph.D., Assistant Professor (Environmental Science and Policy)	
Heidi L. Ballard, Ph.D., Associate Professor (School of Education)	
Marissa L. Baskett, Ph.D., Associate Professor (Environmental Science and Policy)	
Alison M. Berry, Ph.D., Professor (Plant Sciences)	
Robert L. Bettinger, Ph.D., Professor (Anthropology)	
Monique Borgerhoff Mulder, Ph.D., Professor (Anthropology)	
Louis W. Botsford, Ph.D., Professor (Wildlife, Fish, and Conservation Biology)	
Walter M. Boyce, Ph.D., Professor (Pathology, Microbiology, and Immunology)	
Patrick H. Brown, Ph.D., Professor (Plant Sciences)	
Mary Cadenasso, Ph.D., Associate Professor (Plant Sciences)	
James Carey, Ph.D., Professor (Entomology)	
Tim Caro, Ph.D., Professor (Wildlife, Fish, and Conservation Biology)	
Edward P. Caswell-Chen, Ph.D., Professor (Nematology)	
Thomas Coombs-Hahn, Ph.D., Professor (Neurobiology, Physiology, and Behavior)	
Anthony V. Cornel, Ph.D., Associate Professor (Entomology)	
Howard V. Cornell, Ph.D., Professor Emeritus (Environmental Science and Policy)	
Margaret Crofoot, Ph.D., Assistant Professor (Anthropology)	
Randy A. Dahlgren, Ph.D., Professor (Land, Air and Water Resources) Academic Senate Distinguished Teaching Award	
Christyann M. Darwent, Ph.D., Associate Professor (Anthropology)	
Serge I. Doroshov, Ph.D., Professor (Animal Science)	
John M. Eadie, Ph.D., Professor (Wildlife, Fish, and Conservation Biology)	
Jonathan Eisen, Ph.D., Professor (Evolution and Ecology)	
Deborah L. Elliott-Fisk, Ph.D., Professor (Wildlife, Fish, and Conservation Biology)	
Valerie T. Eviner, Ph.D., Associate Professor (Plant Sciences)	
Ian C. Falloona, Ph.D., Assistant Professor (Land, Air, and Water Resources)	
Nann A. Fangu, Ph.D., Assistant Professor (Wildlife, Fish Conservation Biology)	
Y. Hossein Farzin, Ph.D., Professor (Agricultural and Resource Economics)	
Howard Ferris, Ph.D., Professor (Nematology)	
Albert Fischer, Ph.D., Professor (Plant Sciences)	
Janet E. Foley, Ph.D., Professor (VM: Epidemiology)	
Brian Gaylord, Ph.D., Associate Professor (Evolution and Ecology)	
Shu Geng, Ph.D., Professor (Plant Sciences)	
Paul Gepts, Ph.D., Professor (Plant Sciences)	
Matthew E. Gilbert, Ph.D., Assistant Professor (Plant Sciences)	
Steven E. Greco, Ph.D., Associate Professor (Environmental Design)	
Jennifer Gremer, Ph.D., Assistant Professor (Evolution and Ecology)	
Susan L. Handy, Ph.D., Professor (Environmental Science and Policy)	
Susan Harrison, Ph.D., Professor (Environmental Science and Policy)	
Alan Hastings, Ph.D., Professor (Environmental Science and Policy)	
Robert Hijmans, Ph.D., Associate Professor (Environmental Science and Policy)	
Tessa Hill, Ph.D., Associate Professor (Geology)	
Marcel Holyoak, Ph.D., Professor (Environmental Science and Policy)	
William Horwath, Ph.D., Professor (Land, Air and Water Resources)	
Benjamin Z. Houlton, Ph.D., Assistant Professor (Land, Air and Water Resources)	
Silas S. O. Hung, Ph.D., Professor (Animal Science)	
Louise E. Jackson, Ph.D., Professor (Land, Air and Water Resources)	
Marie A. Jasieniuk, Ph.D., Associate Professor (Plant Sciences)	
Yufang Jin, Ph.D., Assistant Professor (Land, Air and Water Resources)	
Richard Karban, Ph.D., Professor (Entomology)	
Ermias Kebreab, Ph.D., Professor (Animal Science)	
Douglas A. Kelt, Ph.D., Professor (Wildlife, Fish, and Conservation Biology)	
Christine Krueder Johnson, Ph.D., Associate Professor (VM: Wildlife Health Center)	
Dietmar Kuelitz, Ph.D., Associate Professor (Animal Science)	
Emilio A. Laca, Ph.D., Professor (Plant Sciences)	
John Largier, Ph.D., Professor (Environmental Science and Policy)	
Andrew M. Latimer, Ph.D., Assistant Professor (Plant Sciences)	
Sharon P. Lawler, Ph.D., Professor (Entomology)	
Edwin E. Lewis, Ph.D., Professor (Nematology)	
C. Y. Cynthia Lin, Ph.D., Associate Professor (Agricultural and Resource Economics, Environmental Science and Policy)	
Mark Lubell, Ph.D., Professor (Environmental Science and Policy)	
Brenda McCowan, Ph.D., Professor (VM: Population Health and Reproduction)	
Richard L. McElreath, Ph.D., Associate Professor (Anthropology)	
Neil McRoberts, Ph.D., Assistant Professor (Plant Pathology)	
Michael R. Miller, Ph.D., Assistant Professor (Animal Science)	
Frank M. Mitloehner, Ph.D., Associate Professor (Animal Science)	
Steven G. Morgan, Ph.D., Professor (Environmental Science and Policy, Bodega Marine Laboratory)	
Peter B. Moyle, Ph.D., Professor (Wildlife, Fish, and Conservation Biology)	
Steven A. Nadler, Ph.D., Professor (Nematology)	
David Neale, Ph.D., Professor (Plant Sciences)	
Gabrielle Nevitt, Ph.D., Professor (Neurobiology, Physiology, Behavior)	
Debbie A. Niemeier, Ph.D., Professor (Civil and Environmental Engineering)	
Gregory Pasternack, Ph.D., Professor (Land, Air and Water Resources)	

Fall 2011 and on Revised General Education (GE): AH=Arts and Humanities; SE=Science and Engineering; SS=Social Sciences;

ACGH-American Cultures; DD=Domestic Diversity; OL=Oral Skills; QL=Quantitative; SL=Scientific; VL=Visual; WC=World Cultures; WE=Writing Experience

Pre-Fall 2011 General Education (GE): ArtHum=Arts and Humanities; SciEng=Science and Engineering; SocSci=Social Sciences; Div=Domestic Diversity; Wrt=Writing Experience

Quarter Offered: F=Fall, W=Winter, S=Spring, Su=Summer; 2017-2018 offering in parentheses

Gail L. Patricelli, Ph.D., Assistant Professor (*Evolution and Ecology*)  
 Kyaw Tha Paw U, Ph.D., Professor (*Land, Air and Water Resources*)  
 Dan Potter, Ph.D., Professor (*Plant Sciences*)  
 James F. Quinn, Ph.D., Professor (*Environmental Science and Policy*)  
 Marcel Rejmanek, Ph.D., Professor (*Evolution and Ecology*)  
 Eliska Rejmankova, Ph.D., Professor (*Environmental Science and Policy*)  
 David Rizzo, Ph.D., Professor (*Plant Pathology*)  
 Jorge Luiz Mazza Rodrigues, Ph.D., Associate Professor (*Land Air & Water Resources*)  
 Jay Rosenheim, Ph.D., Professor (*Entomology*)  
 Academic Senate Distinguished Teaching Award  
 Jeffrey Rossell-Barra, Ph.D., Associate Professor (*Plant Sciences*)  
 James N. Sanchirico, Ph.D., Professor (*Environmental Science and Policy*)  
 Eric D. Sanford, Ph.D., Associate Professor (*Evolution and Ecology*)  
 S.G. Schladow, Ph.D., Professor (*Civil and Environmental Engineering*)  
 Johanna Schmitt, Ph.D., Professor (*Evolution & Ecology*)  
 Thomas W. Schoener, Ph.D., Professor (*Evolution and Ecology*)  
 Sebastian Schreiber, Ph.D., Professor (*Evolution and Ecology*)  
 Mark W. Schwartz, Ph.D., Professor (*Environmental Science and Policy*) Academic Senate Distinguished Teaching Award  
 Kate M. Scow, Ph.D., Professor (*Land, Air and Water Resources*)  
 Arthur M. Shapiro, Ph.D., Distinguished Professor (*Evolution and Ecology*)  
 Andrew Sih, Ph.D., Professor (*Environmental Science and Policy*)  
 David R. Smart, Ph.D., Associate Professor (*Viticulture and Enology*)  
 Michael R. Springborn, Ph.D., Assistant Professor (*Environmental Science and Policy*)  
 Jay Stachowicz, Ph.D., Professor (*Evolution and Ecology*) Academic Senate Distinguished Teaching Award  
 Maureen Stanton, Ph.D., Professor (*Evolution and Ecology*)  
 Sharon Y. Strauss, Ph.D., Professor (*Evolution and Ecology*)  
 Donald Strong, Ph.D., Professor (*Evolution and Ecology*)  
 Ron Tjeerdema, Ph.D., Professor (*Environmental Toxicology*)  
 Brian Todd, Ph.D., Assistant Professor (*Wildlife, Fish Conservation Biology*)  
 Anne Todgham, Ph.D., Assistant Professor (*Animal Science*)  
 Thomas P. Tomich, Ph.D., Professor (*Environmental Science and Policy, Human and Community Development*)  
 Susan L. Ustin, Ph.D., Professor (*Land, Air and Water Resources*)  
 Chris Van Kessel, Ph.D., Professor (*Plant Sciences*)  
 Dirk Van Vuren, Ph.D., Professor (*Wildlife, Fish, and Conservation Biology*)  
 Astrid Volder, Ph.D., Assistant Professor (*Plant Sciences*)  
 Peter C. Wainwright, Ph.D., Professor (*Evolution and Ecology*) Academic Senate Distinguished Teaching Award  
 Andrew Whitehead, Ph.D., Assistant Professor (*Environmental Toxicology*)  
 Neal M. Williams, Ph.D., Assistant Professor (*Entomology*)  
 Susan L. Williams, Ph.D., Professor (*Evolution and Ecology*)  
 Louie H. Yang, Ph.D., Assistant Professor (*Entomology*)  
 Truman P. Young, Ph.D., Professor (*Plant Sciences*)  
 Maciej Zwieniecki, Ph.D., Associate Professor (*Plant Sciences*)

## Affiliated Faculty

William Bennett, Ph.D., Associate Researcher Ecologist (*John Muir Institute of the Environment*)  
 Richard E. Connon, Ph.D., Assistant Adjunct Professor (*Vet Med*)  
 Edwin DeHaven Grosholz, Ph.D., Professor, Cooperative Extension Specialist (*Environmental Science and Policy*)  
 Richard Y. Evans, Ph.D., Extension Specialist (*Plant Sciences*)  
 Erica Fleishman, Ph.D., Researcher (*Environmental Science and Policy*)  
 Elise Gornish, Ph.D., Assistant Specialist Cooperative Extension (*Plant Sciences*)  
 Joshua M. Hull, Ph.D., Assistant Adjunct Professor (*Animal Science*)  
 Peter Klimley, Ph.D., Adjunct Professor, Associate Research Biologist (*Bodega Marine Laboratory*)  
 Bernie May, Ph.D., Adjunct Professor (*Animal Science*)  
 A. Keith Miles, Ph.D., Adjunct Professor (*Wildlife, Fish, and Conservation Biology*)  
 Malcolm North, Ph.D., Research Associate (*Plant Sciences*)  
 Lorence Oki, Ph.D., Associate Specialist in Cooperative Extension (*Plant Sciences*)  
 Leslie Roche, Ph.D., Assistant Specialist in Cooperative Extension (*Plant Sciences*)  
 Ben Sacks, Ph.D., Adjunct Associate Professor (*VM: Population Health and Reproduction*)  
 Hugh Safford, Ph.D., Associate-in (*Environmental Science and Policy*)  
 Samuel Sandoval Solis, Ph.D., Assistant Specialist in Cooperative Extension (*Land, Air and Water Resources*)  
 Andrea Schreier, Ph.D., Adjunct Assistant Professor (*Animal Science*)  
 Kenneth W. Tate, Ph.D., Cooperative Extension Specialist (*Plant Sciences*)  
 Swee Teh, Ph.D., Associate Research Toxicologist/ Pathologist (*Anatomy, Physiology and Cell Biology*)  
 Lisa C. Thompson, Ph.D., Associate Specialist in Cooperative Extension (*Wildlife, Fish, and Conservation Biology*)  
 Minghua Zhang, Ph.D., Associate Adjunct Professor (*Land, Air and Water Resources*)

**Graduate Study.** The Graduate Group in Ecology offers the M.S. and Ph.D. degrees. Ecology is a science that integrates numerous fields of study to attain deep understanding of natural and societal influences on the distribution, abundances, behaviors, traits, and ecosystem functions of organisms. In order to accommodate varied student interests, the Group has developed several 'areas of emphasis' with specialized programs of study: agricultural ecology, conservation ecology, ecosystems and landscape ecology, ecotoxicology, environmental policy and human ecology, integrative ecology, marine ecology, physiological ecology and restoration ecology. For further details, contact the Group office.

**Preparation.** Appropriate preparation is undergraduate work in any of the biological, social or behavioral, and physical sciences, mathematics or engineering. Applicants will normally be expected to have completed the following courses during the undergraduate years or shortly after matriculating: two courses each in introductory biology, general chemistry and physical science; one course each in calculus, an upper division introduction to ecology course and introductory statistics. Students that choose the environmental policy and human ecology area of emphasis are only required to complete one course in general chemistry. They may also substitute one quantitative course in social science such as micro- or macro-economics for one chemistry or physics requirement.

**Graduate Advisers.** E. Kebreab, S. Lawler, E. Lewis (*Ecosystems and Landscape Ecology*), M. Lubell, M. Miller, P. Moyle, E. Rejmankova, K. Rice (*Restoration Ecology*), J. Richards (*Integrative Ecology*), B. Sacks, J. Sanchirico (*Environmental Policy & Human Ecology*), E. Sanford (*Marine Ecology*), A. Shapiro (*Conservation Ecology*), M. Springborn, D.

Strong, R. Tjeerdema (*Ecotoxicology and Physiological Ecology*), A. Whitehead (*Ecological Genomics and Genetics*), N. Williams (*Agricultural Ecology*)

## Courses in Ecology (ECL)

### Graduate

#### 203. Physiological Ecology (3)

Lecture—3 hours. Prerequisite: Evolution and Ecology 101 or Environmental Studies 100; Neurobiology, Physiology, and Behavior 110 or Plant Biology 111 or Environmental Studies 129; elementary calculus. A comparative examination of several animal groups addressing fundamental physiological mechanisms that shape the ecology of each animal group. Offered in alternate years.—S.

#### 204. Population and Community Ecology (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Evolution and Ecology 101, Mathematics 21A-21B or consent of instructor; Mathematics 22B recommended. Review of major concepts of population ecology and community ecology, with emphasis on the rationale of theory and use of theory as applied in the ecology of natural and managed systems. Offered in alternate years.—F. (F.)

#### 205. Community Ecology (4)

Lecture—2 hours; discussion—2 hours. Prerequisite: an upper-division course in ecology. Introduction to literature and contemporary research into processes structuring ecological communities.—W. (W.) Karban, Lawler

#### 206. Concepts and Methods in Plant Community Ecology (4)

Lecture—3 hours; laboratory—4 hours. Prerequisite: introductory courses in statistics and plant ecology; consent of instructor. Principles and techniques of vegetation analysis, including structure, composition, and dynamics. Emphasis given to sampling procedures, association analysis, ordination, processes and mechanisms of succession, and classification. Most techniques are demonstrated or conducted during field trips and laboratories. Offered in alternate years.—F. (F.) Rejmanek

#### 207. Plant Population Biology (3)

Lecture—2 hours; laboratory/discussion—1 hour. Prerequisite: advanced undergraduate ecology course (e.g., Environmental Science and Policy 100, Evolution and Ecology 101, Entomology 104 or Plant Biology 117), and advanced undergraduate course in genetics and/or evolution (e.g., Biological Sciences 101 or Evolution and Ecology 100). Introduction to theoretical and empirical research in plant population biology. Emphasis placed on linking ecological and genetic approaches to plant population biology. (Same course as Population Biology 207.) Offered in alternate years.—(W.)

#### 208. Issues in Conservation Biology (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: introductory biology (e.g. Biological Sciences 2B) and an upper division organismal biology class. Graduate-level introduction to current research in conservation biology. Course will emphasize reading and discussing primary literature. Specific topics will reflect the research interests of UC Davis conservation biology faculty.—W. S. (W. S.) Baskett

#### 210N. Environmental Policy and Human Ecology (4)

Lecture—3 hours; term paper. Prerequisite: graduate standing in Anthropology, Ecology, Political Science, Sociology Graduate Groups, or consent of instructor. Principles drawn from social science, ecology and evolution to study of human populations and behavior, emphasizing environmental/resource issues. These principles form a synthetic framework that articulates elements drawn from the social sciences as well as biology. Offered in alternate years.—(W.) Lubell, McElreath

#### 211. Advanced Topics in Cultural Ecology (4)

Lecture/discussion—3 hours; term paper. Prerequisite: Environmental Science and Policy 133/Anthropology 133 and graduate standing in Ecology or

**Anthropology.** Topics of current analytical and methodological importance in cultural ecology. Examination of general issues in cultural ecology through study of human response to and influences on climate. (Same course as Anthropology 211.) Offered in alternate years. —F. McElreath

#### **212A. Environmental Policy Process (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course in public policy (e.g., Environmental Studies 160) or environmental law (e.g., Environmental Studies 161); course in bureaucratic theory (e.g., Political Science 187 or Environmental Studies 166); course in statistics (e.g., Sociology 106 or Agricultural and Resource Economics 106). Introduction to selected topics in the policy process, applications to the field of environmental policy. Develops critical reading skills, understanding of frameworks of the policy process and political behavior, and an ability to apply multiple frameworks to the same phenomena. (Same course as Environmental Science and Policy 212A.) Offered in alternate years. —(F, S.) Lubell

#### **212B. Environmental Policy Evaluation (4)**

Lecture—1 hour; discussion—1 hour; seminar—2 hours. Prerequisite: intermediate microeconomics (e.g., Economics 100); Statistics 108 or Agricultural and Resource Economics 106; policy analysis (e.g., Environmental Studies 168A or the equivalent); Agricultural and Resource Economics 176. Methods and practices of policy analysis; philosophical and intellectual bases of policy analysis and the political role of policy analysis. (Same course as Environmental Science and Policy 212B.) Offered in alternate years. —(W, S.) Springborn

#### **213. Population, Environment, and Social Structure (4)**

Seminar—3 hours; term paper. Prerequisite: at least one course in population or human ecology, or in environment and resources. Relationships among population dynamics, resource scarcity and environmental problems, and social structure; focus on demographic content of global ecological models and simulations, ecological content of modern demographic theories, and debates about scarcity, inequality, and social conflict and change. Offered in alternate years. —S.

#### **214. Marine Ecology: Concepts and Practice (3)**

Lecture—1 hour; discussion—1.5 hours; fieldwork—1.5 hours. Prerequisite: graduate standing or one course in ecology, one course in evolution or genetics, and consent of instructor; survey course in marine ecology recommended. Critical review and analysis of concepts and practices in modern marine ecology at the interface of several fields of study including oceanography, evolution, behavior, and physiology. Emphasis on critical thinking, problem solving, and hands-on study. Two field trips required. —F, S. (F, S.) Morgan, Williams

#### **216. Ecology and Agriculture (4)**

Lecture—3 hours; term paper. Prerequisite: Evolution and Ecology 11 or consent of instructor. Ecological principles as relevant to agriculture. Integration of ecological approaches into agricultural research to increase ecosystem functions and services. Topics include crop autoecology, biotic interactions among crops and pests, ecosystem and landscape ecology. Not open for credit to students who have completed Vegetable Crops 216 (Former course Vegetable Crops 216). Offered in alternate years. —F. Jackson

#### **219. Ecosystem Biogeochemistry (4)**

Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: introductory courses in ecology/biology and soils are recommended; undergraduates accepted with consent of instructor. Multi-disciplinary analysis of energy and nutrient transfers within terrestrial ecosystems. Examination of processes and inter- and intra-system interactions between the atmosphere, biosphere, lithosphere, and hydrosphere. Laboratory section uses biogeochemical simulation models to examine case studies. (Same course as Soil Science 219.) Offered in alternate years. —S. Houlton

#### **225. Terrestrial Field Ecology (4)**

Seminar—1 hour; field work—12 hours. Prerequisite: introductory ecology and introductory statistics or consent of instructor. A field course conducted over spring break and four weekends at Bodega Bay, emphasizing student projects. Ecological hypothesis testing, data gathering, analysis, and written and oral presentation of results will be stressed. (Same course as Entomology 225/Population Biology 225.) —S. Karban

#### **231. Mathematical Methods in Population Biology (3)**

Lecture—3 hours. Prerequisite: Mathematics 16C or 21C or the equivalent. Mathematical methods used in population biology. Linear and nonlinear difference equation and differential equation models are studied, using stability analysis and qualitative methods. Partial differential equation models are introduced. Applications to population biology models are stressed. (Same course as Population Biology 231.) —F. Hastings

#### **232. Theoretical Ecology (3)**

Lecture—3 hours. Prerequisite: course 204 or the equivalent, and Mathematics 16C or 21C; or one of courses 100 or 121 or Evolution and Ecology 101, and a strong mathematics background (Mathematics 22A-22B-22C or the equivalent). Examination of major conceptual and methodological issues in theoretical ecology. Model formulation and development will be emphasized. Topics will vary from year to year. May be repeated for credit. Offered in alternate years. —(W) Hastings

#### **233. Computational Methods in Population Biology (3)**

Lecture/laboratory—2 hours; discussion/laboratory—1 hour. Prerequisite: A course in theoretical ecology (e.g., course 231 or an equivalent to Environmental Science and Policy 121 from your undergraduate institution) or consent of instructor; no programming experience required. Numerical methods for simulating population dynamics using the computational software package R. Emphasis placed on model formulation and development, theoretical concepts and philosophical principles to guide simulation efforts, model parameterization, and implementing simulations with R. (Same course as Population Biology 233.) Offered in alternate years. (S/U grading only.) —W. Baskett, Schreiber

#### **242. Ecological Genetics: Applied Genetics for Ecology, Health, and Conservation of Natural Populations (3)**

Lecture—2 hours; discussion—0.5 hours; laboratory—0.5 hours. Prerequisite: undergraduate genetics and ecology/conservation biology courses recommended. Class size limited to 20 students; graduate students, 2nd or 3rd year veterinary students; advanced undergraduate students with consent of instructor. Introduction to the field of applied ecological genetics to include applications in conservation ecology, population genetics, population biology, wildlife health and disease ecology. (Same course as Population Health and Reproduction 242.) —F. (F)

#### **242. Ecological Genetics: Applied Genetics for Ecology, Health, and Conservation of Natural Populations (3)**

Lecture—2 hours; discussion—0.5 hours; laboratory—0.5 hours. Prerequisite: undergraduate genetics and ecology/conservation biology courses recommended. Class size limited to 20 students; graduate students, 2nd or 3rd year veterinary students; advanced undergraduate students with consent of instructor. Introduction to the field of applied ecological genetics to include applications in conservation ecology, population genetics, population biology, wildlife health and disease ecology. (Same course as Population Health and Reproduction 242.) —W. (W) Ernest

#### **243. Ecological Genomics (4)**

Lecture/discussion—3 hours; term paper or discussion. Prerequisite: course 242, or equivalent training in ecology and genetics according to the discretion of the instructors. Genomics concepts, technologies,

and analyses for ecology research. Mixture of lecture, discussion of recent literature, hands-on training in data analysis and experimental design, and research proposal preparation and evaluation. One all-day field trip is required. —W. (W) Miller, Ross-Ibarra, Whitehead

#### **245. Climate Change, Water and Society (4)**

Lecture—4 hours. Class size limited to 25 students. Integration of climate science and hydrology with policy to understand hydroclimatology and its impact upon natural and human systems. Assignments: readings, take-home examination on climate and hydrologic science, paper that integrates course concepts into a research prospectus or review article. (Same course as Hydrologic Science 245 and Atmospheric Science 245.) —F. (F) Fogg, Lubell, Ullrich

#### **262. Advanced Population Dynamics (3)**

Lecture—3 hours. Prerequisite: graduate standing; advanced course in ecology (e.g., Evolution and Ecology 101), population dynamics (e.g., Wildlife, Fish, and Conservation 122), and one year of calculus; familiarity with matrix algebra and partial differential equations recommended. Logical basis for population models; evaluation of simple ecological models, current population models with age, size, and stage structure, theoretical basis for management and exemplary case histories. Emphasis on development and use of realistic population models in ecological research. (Same course as Wildlife, Fish, and Conservation Biology 262.) Offered irregularly. —W. (W) Botsford

#### **271. Research Conference in Ecology (1)**

Seminar—1 hour. Prerequisite: consent of instructor. Critical presentation and evaluation of current literature and ongoing research in ecology. Requirements include active participation in weekly discussions and the presentation of a paper or chapter once per quarter. May be repeated for credit. (Same course as Population Biology 271.) (S/U grading only.) —F, W, S. (F, W, S.) Schoener, Schreiber

#### **280. Current Anthropology Journal Editorial Workshop (4)**

Workshop—1 hour; independent study—3 hours. Prerequisite: consent of instructor. Students must enroll for all three quarters. Reading and offering workshop critiques of manuscripts submitted for publication, and reading and discussion of other relevant work in anthropology and human ecology. Track and edit published comments and authors' replies that accompany major features. Participation in the development of new sections for the electronic edition of the journal, including a "news and views" section and a debate section. (Same course as Anthropology 280.) May be repeated for 12 units of credit with consent of instructor. (S/U grading only.) —F, W, S. (F, W, S.)

#### **290. Seminar in Ecology (1-4)**

Seminar—1—4 hours. Prerequisite: consent of instructor. Topics in ecology. Students are expected to present an oral seminar on a particular aspect of the general topic under consideration. (S/U grading only.) —F, W, S. (F, W, S.)

#### **296. Topics in Ecology and Evolution (1)**

Seminar—1 hour. Prerequisite: graduate standing. Seminars presented by visiting lecturers, UC Davis faculty, and graduate students. May be repeated for credit. (Same course as Population Biology 292.) (S/U grading only.) —F, W, S. (F, W, S.)

#### **297. Tutoring in Ecology (1-4)**

Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing in ecology; consent of instructor. Teaching ecology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated for credit. (S/U grading only.)

#### **298. Group Study (1-5)**

(S/U grading only.)

#### **299. Research (1-12)**

Prerequisite: graduate standing. (S/U grading only.)

# Economics

(College of Letters and Science)

Giovanni Peri, Ph.D., Chairperson of the Department  
**Department Office.** 2216 Social Sciences and  
 Humanities Building  
 530-752-9241; <http://www.econ.ucdavis.edu>

## Faculty

Paul Bergin, Ph.D., Professor  
 Marianne P. Bitler, Ph.D., Professor  
 Andre Boik, Ph.D., Assistant Professor  
 Giacomo Bonanno, Ph.D., Professor  
 James Bushnell, Ph.D., Professor  
 Colin Cameron, Ph.D., Professor  
 Scott E. Carrell, Ph.D., Associate Professor  
 Andres Carvajal, Ph.D., Associate Professor  
 Gregory Clark, Ph.D., Professor  
 Katherine Eriksson, Ph.D., Assistant Professor  
 Robert C. Feenstra, Ph.D., Professor  
 Athanasios Geromichalos, Ph.D., Assistant Professor  
 Espen Henriksen, Ph.D., Assistant Professor  
 Oscar Jorda, Ph.D., Professor  
 Christopher M. Meissner, Ph.D., Professor  
 Erich Muehlegger, Ph.D., Assistant Professor  
 Marianne E. Page, Ph.D., Professor  
 Giovanni Peri, Ph.D., Professor  
 Martine Quinzii, Ph.D., Professor  
 Dave Rapson, Ph.D., Associate Professor  
 Katheryn N. Russ, Ph.D., Associate Professor  
 Burkhard C. Schipper, Ph.D., Professor  
 Shu Shen, Ph.D., Assistant Professor  
 Ina Simonovska, Ph.D., Associate Professor  
 Monica Singhal, Ph.D., Associate Professor  
 Ann Huff Stevens, Ph.D., Professor  
 Derek Stadelman, Ph.D., Lecturer  
 Deborah Swenson, Ph.D., Professor  
 Alan M. Taylor, Ph.D., Professor  
 Janine Wilson, Ph.D., Lecturer  
 Wing T. Woo, Ph.D., Professor

## Emeriti Faculty

Andrzej Brzeski, Ph.D., Professor Emeritus  
 L. Jay Helms, Ph.D., Professor Emeritus  
 Kevin D. Hoover, D.Phil., Professor Emeritus  
 Hiromitsu Kaneda, Ph.D., Professor Emeritus  
 Peter H. Lindert, Ph.D., Professor Emeritus  
*Academic Senate Distinguished Teaching Award*  
 Louis Makowski, Ph.D., Professor Emeritus  
 Klaus Nehring, Ph.D., Professor Emeritus  
 Alan L. Olmstead, Ph.D., Professor Emeritus  
 Kevin D. Salyer, Ph.D., Professor Emeritus  
 Steven M. Sheffrin, Ph.D., Professor Emeritus  
 T. Y. Shen, Professor Emeritus  
 Joaquim Silvestre, Professor Emeritus  
 Elias H. Tuma, Ph.D., Professor Emeritus  
 Gary M. Walton, Ph.D., Professor Emeritus  
 Leon L. Wegge, Ph.D., Professor Emeritus

## Affiliated Faculty

Bagher Modjtahedi, Ph.D., Lecturer

## The Major Program

Economics is the study of how individuals, organizations, and societies choose among alternative uses of resources and how these resources are turned into the things people want.

**The Program.** Economics majors complete an introductory course sequence in economics, in addition to several courses in quantitative methods. Intermediate theory and economic history are taken on the upper division level and then students are free to concentrate the remainder of their units in various areas of interest, including more courses in economic theory or history, international economics, labor, industry, alternative economic systems, economic development, public finance, econometrics, or mathematical economics.

**Internships and Career Alternatives.** Internships for economics majors have been arranged at banks, brokerages, other business enterprises, and governmental units. The internships must complement the student's course work. A degree in economics is

excellent preparation for students who want to go on to law school, business school, advanced work in economics, or graduate work in international relations. It is also a good background for careers in management and positions with the government.

## A.B. Major Requirements:

### UNITS **Preparatory Subject Matter.....17-20**

Economics 1A-1B ..... 8  
 Statistics 13, 32, or 102 ..... 3-4  
 Mathematics 16A-16B or 21A-21B ..... 6-8

### **Depth Subject Matter .....44**

Economics 100, 101 ..... 8  
 Economics 102 ..... 4

### Choose one specialization below:

#### *Specialization: General*

One course from: Economics 110A, 110B, 111A, 111B ..... 4

Select 4 courses from:

Economics 103, 106, 116, 121A, 121B, 122, 125, 130, 131, 132, 134 (or Agricultural and Resource Economics 171A), 135, 136, 137, 140 (or Agricultural and Resource Economics 106), 145, 151A, 151B, 152, 160A, 160B, 194HA, 194HB, Agricultural and Resource Economics 139, 156, 175, 176 ..... 16

Additional upper division Economics courses ..... 12

#### *Specialization: Behavior and Strategy*

One course from:

Economics 110A, 110B, 111A, 111B ..... 4

Economics 121A or 122 ..... 4

Select 2 courses from:

Economics 103, 106, 121A, 121B, 122 .. 8

Select 1 course from:

Economics 103, 106, 116, 121A, 121B, 122, 125, 130, 131, 132, 134 (or Agricultural and Resource Economics 171A), 135, 136, 137, 140 (or Agricultural and Resource Economics 106), 145, 151A, 151B, 152, 160A, 160B, 194HA, 194HB, Agricultural and Resource Economics 139, 156, 175, 176 ..... 16

Additional upper division Economics courses ..... 12

#### *Specialization: Data Analytics and Economics Analysis*

One course from:

Economics 110A, 110B, 111A, 111B ..... 4

Economics 140 ..... 4

Select 2 courses from:

Economics 103, 106, 122, and either 132 or 145 ..... 8

Select 1 course from:

Economics 103, 106, 116, 121A, 121B, 122, 125, 130, 131, 132, 134 (or Agricultural and Resource Economics 171A), 135, 136, 137, 140 (or Agricultural and Resource Economics 106), 145, 151A, 151B, 152, 160A, 160B, 194HA, 194HB, Agricultural and Resource Economics 139, 156, 175, 176 ..... 4

Additional upper division Economics courses ..... 12

#### *Specialization: International Macro-Finance*

One course from:

Economics 110A, 110B, 111A, 111B ..... 4

Select 3 courses from:

Economics 110B, 134, 135, 136, 160B, 171 ..... 12

Select 3 course from:

Economics 103, 106, 116, 121A, 121B, 122, 125, 130, 131, 132, 134 (or Agricultural and Resource Economics 171A), 135, 136, 137, 140 (or Agricultural and Resource Economics 106), 145, 151A, 151B, 152, 160A, 160B, 194HA, 194HB, Agricultural and Resource Economics 139, 156, 175, 176 ..... 12

Additional upper division Economics courses ..... 12

#### *Specialization: Policy*

One course from:

Economics 110A, 110B, 111A, 111B ..... 4

Select 3 courses from:

Economics 110B, 134, 135, 136, 160B, 171 ..... 12

Select 3 course from:

Economics 103, 106, 116, 121A, 121B, 122, 125, 130, 131, 132, 134 (or Agricultural and Resource Economics 171A), 135, 136, 137, 140 (or Agricultural and Resource Economics 106), 145, 151A, 151B, 152, 160A, 160B, 194HA, 194HB, Agricultural and Resource Economics 139, 156, 175, 176 ..... 12

Additional upper division Economics courses ..... 12

Select 4 units from upper division Economics courses ..... 4

One course from:

Economics 110A, 110B, 111A, 111B ..... 4

Select 3 courses from:

Economics 125, 130, 131, 145, 151A, 151B, 160A ..... 12

Select 1 course from:

Economics 103, 106, 116, 121A, 121B, 122, 125, 130, 131, 132, 134 (or Agricultural and Resource Economics 171A), 135, 136, 137, 140 (or Agricultural and Resource Economics 106), 145, 151A, 151B, 152, 160A, 160B, 194HA, 194HB, Agricultural and Resource Economics 139, 156, 175, 176 ..... 4

Additional upper division Economics courses ..... 12

#### *Specialization: Poverty and Inequality*

One course from:

Economics 110A, 110B, 111A, 111B ..... 4

Select 3 courses from:

Economics 115A, 115B, 130, 151B ..... 12

Select 3 courses from:

Economics 103, 106, 116, 121A, 121B, 122, 125, 130, 131, 132, 134 (or Agricultural and Resource Economics 171A), 135, 136, 137, 140 (or Agricultural and Resource Economics 106), 145, 151A, 151B, 152, 160A, 160B, 194HA, 194HB, Agricultural and Resource Economics 139, 156, 175, 176 ..... 12

Additional upper division Economics courses ..... 12

Select 4 courses from:

Economics 103, 106, 116, 121A, 121B, 122, 125, 130, 131, 132, 134 (one of which may be from History 108, 109B, 110, 110A, 111A-C, 112A, 112B, 112C, 113, 115A-F, 116, 120, 121A-C, 122, 125, 130A-C, 131A-C, 132, 133, 134A, 135A-B, 138A-C, 139A-B, 140, 141, 142A-B, 143, 144A-B, 145, 146A-B, 147A-C, 148A-C, 149, 151A-D, 159, 160, 162, 163A-B, 164, 165, 166A-B, 167, 168, 169A-B, 170A-C, 171A-B, 171D, 172, 173, 174A, 174B, 174C, 174D, 175, 176A-B, 177A-B, 178A-B, 179, 180AN, 181, 182, 183A-B, 184, 185A-B, 188, 189, 190A-D, 191A-J, 193A-D, 194A-E, 195B, 196A-B ..... 16

Choose 4 courses from:

Economics 103, 106, 116, 121A, 121B, 122, 125, 130, 131, 132, 134 (or Agricultural and Resource Economics 171A), 135, 136, 137, 140 (or Agricultural and Resource Economics 106), 145, 151A, 151B, 152, 160A, 160B, 194HA, 194HB, Agricultural and Resource Economics 139, 156, 175, 176 ..... 16

Total Units for the Major ..... 61-64

**Recommended.** Students considering graduate study in economics are strongly urged to take Mathematics 21A-21B-21C and 22A.

The Economics Department suggests that Economics 100 and 101 be taken as soon as possible after the introductory courses.

**Major Advisers.** Contact Department office at [ecnugadvisor@ucdavis.edu](mailto:ecnugadvisor@ucdavis.edu) or 530-752-9142.

## Minor Program Requirements:

### UNITS **Economics .....20**

Economics 100, 101 ..... 8

Select 8 units from Economics 103, 106,

116, 121A, 121B, 122, 125, 130, 131,

132, 134 (or Agricultural and Resource

Economics 171A), 135, 136, 137, 140 (or

Agricultural and Resource Economics 106), 145,

151A, 151B, 152, 160A, 160B;

Agricultural and Resource Economics 139,

156, 175, 176 ..... 8

Select 4 units from upper division Economics

courses ..... 4

**Preparation.** Economics 1A and 1B; Statistics 13, 32, or 102; Mathematics 16A and 16B or 21A and 21B; Mathematics 16A and 16B or 21A and 21B

should be completed before taking Economics 100 and 101. Students need to complete Economics 100 and 101 before taking the advanced courses.

**Course Limits.** Except under extraordinary circumstances, not more than two economics courses should be taken in any one quarter. In special cases, the department will accept a limited number of related upper division courses from other departments in satisfaction of the economics upper division course requirements. Approval from a departmental adviser is required in all such cases.

**Graduation with High or Highest Honors.** To be eligible for departmental recommendation for High or Highest Honors in Economics at graduation, a student must take all upper division courses in Economics for a letter grade, earn at least a 3.500 grade point average in those courses, and complete at least eight units of course work that result in the submission of an Honors project. Consult the College of Letters and Science section of this catalog and contact the Department for more information.

**Study Abroad.** The economics department wishes to accommodate students who would like to complement their economics degree with a study abroad experience. Up to 20 units of upper division credit from foreign campuses (excluding Economics 100 and 101) may be used towards the completion of the degree. To ensure that foreign courses will apply towards the economics degree, students need to select courses from the pre-approved list at the UC Davis Study Abroad office or seek pre-approval in the economics department for the foreign courses they wish to complete.

**Graduate Study.** Students who meet the admission requirements of Graduate Studies and the Department of Economics may pursue studies leading to the M.A. and Ph.D. degrees. Fields of emphasis for graduate study include: Economic Theory, Monetary Economics, Economic Development, Economic History, International Economics, Labor Economics, Industrial Organization, Economic Systems, Public Finance, Mathematical Economics, and Quantitative Methods (Econometrics). For information on admission to graduate study, degree requirements, and financial aid, consult the Graduate Announcement and <http://www.econ.ucdavis.edu>.

**Graduate Advisers.** Contact Department office.

**American History and Institutions.** This University requirement can be satisfied by completion of Economics 111A, 111B; see also under University requirements.

## Courses in Economics (ECN)

### Lower Division

#### 1A. Principles of Microeconomics (4)

Lecture—3 hours; discussion—1 hour. Course 1A and 1B may be taken in either order. Analysis of the allocation of resources and the distribution of income through a price system; competition and monopoly; the role of public policy; comparative economic systems. GE credit: SocSci | ACGH, QL, SS. —F, W, S. (F, W, S.)

#### 1B. Principles of Macroeconomics (4)

Lecture—3 hours; discussion—1 hour. Course 1A and 1B may be taken in either order. Analysis of the economy as a whole; determinants of the level of income, employment and prices; money and banking, economic fluctuations, international trade, economic development; the role of public policy. GE credit: GE credit: SocSci | ACGH, QL, SS. —F, W, S. (F, W, S.)

#### 90X. Lower Division Seminar (1-2)

Seminar—1-2 hours. Prerequisite: lower division standing and consent of instructor. Limited enrollment. Examination of a special topic in Economics through shared readings, discussions, and written assignments. May not be repeated for credit.

#### 92. Internship and Field Work (1-12)

Internship—3-36 hours; term paper. Prerequisite: junior or senior standing; availability of internship position or approved field work project; stock-brokerage interns must have completed Management

11A-11B; consent of instructor. Intensive study of practical application of concepts in economics, stressing research methods and empirical analysis. (P/NP grading only.)

#### 98. Group Study for Undergraduates (1-5)

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

#### 99. Individual Study for Undergraduates (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division

#### 100. Intermediate Micro Theory (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A-1B and Mathematics 16A-16B or Mathematics 17A-17B or Mathematics 21A-21B, with a grade of C- or better in each course. Price and distribution theory under conditions of perfect and imperfect competition. General equilibrium and welfare economics. Not open for credit to students who have completed Agricultural and Resource Economics 100A or 100B. —F, W, S. (F, W, S.)

#### 101. Intermediate Macro Theory (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B and Mathematics 16A-16B or Mathematics 17A-17B or Mathematics 21A-21B, with a grade of C- or better in each course. Theory of income, employment and prices under static and dynamic conditions, and long term growth. —F, W, S. (F, W, S.)

#### 102. Analysis of Economic Data (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A, 1B, Statistics 13 or 32, Mathematics 16A-16B or 21A-21B, with grade of C- or better in each, or consent of instructor. Analysis of economic data to investigate key relationships emphasized in introductory microeconomics and macroeconomics. Obtaining, transforming, and displaying data; statistical analysis of economic data; and basic univariate and multivariate regression analysis. Only 2 units of credit allowed to students who have completed course 140 or Agricultural and Resource Economics 106. GE credit: VL. —F, W, S. (F, W, S.)

#### 103. Economics of Uncertainty and Information (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or Agricultural and Resource Economics 100A and 100B, Mathematics 16A and 16B or Mathematics 17A and 17B or Mathematics 21A and 21B. Optimal decisions under uncertainty, expected utility theory, economics of insurance, asymmetric information, signalling in the job market, incentives and Principal-Agent theory, optimal search strategies and the reservation price principle.

#### 106. Decision Making (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A-16B or Mathematics 17A-17B or Mathematics 21A-21B; Statistics 13 or 32, with grade of C- or better in each course, or consent of the instructor. Descriptive and normative analysis of individual decision making, with applications to personal, professional, financial, and public policy decisions. Emphasis on decision making under uncertainty and over time. Heuristics and biases in the psychology of decisions; overcoming decision traps. Offered irregularly.

#### 110A. World Economic History Before the Industrial Revolution (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A and 1B. Development and application of analytical models to explain the nature and functioning of economies before the Industrial Revolution. Examples will be drawn from a variety of societies, including England, China, Polynesia, and Pre-Columbian America. GE credit: SocSci | SS.

#### 110B. World Economic History Since the Industrial Revolution (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A, 1B and 110A. Development and application of analytical models to explain the nature and functioning of economies since the Industrial Revolu-

tion. Examples will be drawn from a variety of societies, including England, China, Germany, and India. GE credit: SocSci | SS.

#### 111A. Economic History (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Survey of economic change in the United States from Colonial times to 1865; reference to other regions in the Western Hemisphere. GE credit: SocSci | SS.

#### 111B. Economic History (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B, or consent of instructor. Survey of economic change in the United States from 1865 to the post World War II era. GE credit: SocSci | SS.

#### 115A. Economic Development (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B. Major issues encountered in emerging from international poverty, including problems of growth and structural change, human welfare, population growth and health, labor markets and internal migration. Important issues of policy concerning international trade and industrialization. (Same course as Agricultural and Resource Economics 115A.) GE credit: SocSci, Div | SS, WC.

#### 115B. Economic Development (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B. Major macroeconomic issues of developing countries. Issues include problems in generating capital, conduct of monetary and fiscal policies, foreign aid and investment. Important issues of policy concerning international borrowing and external debt of developing countries. (Same course as Agricultural and Resource Economics 115B.) GE credit: SocSci | SS, WC.

#### 116. Comparative Economic Systems (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or Agricultural and Resource Economics 100A and 100B; Mathematics 16B or 17B or 21B. Economics analysis of the relative virtues of capitalism and socialism, including welfare economics. Marxian exploitation theory, the socialist calculation debate (Hayek and Lange), alternative capitalist systems (Japan, Germany, U.S.) and contemporary models of market socialism. Offered irregularly. GE credit: WC.

#### 121A. Industrial Organization (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B; 100 or Agricultural and Resource Economics 100A-100B, or consent of the instructor. An appraisal of the role of competition and monopoly in the American economy; market structure, conduct, and economic performance of a variety of industries. GE credit: SocSci | SS.

#### 121B. Industrial Organization (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A, 1B, 100 or Agricultural and Resource Economics 100A and 100B, or consent of instructor. The study of antitrust and economic regulation. Emphasis on applying theoretical models to U.S. industries and case studies, including telecommunications, software, and electricity markets. Topics include natural monopoly, optimal and actual regulatory mechanisms, deregulation, mergers, predatory pricing, and monopolization. GE credit: ACGH.

#### 122. Theory of Games and Strategic Behavior (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A and 16B or 17A and 17B or 21A and 21B or consent of instructor. Introduction to game theory. Explanation of the behavior of rational individuals with interacting and often conflicting interests. Non-cooperative and cooperative theory. Applications to economics, political science and other fields.

#### 125. Efficiency in Energy Markets (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A and 1B, Mathematics 16A and 16B and course 102 or consent of instructor; intended for advanced economics undergraduates. Pass One open to Economics and Graduate School of Management majors. Application of theoretical and empirical models to examine efficiency in energy

production and use. Energy and environmental policy, market structure and power, global climate change, optimal regulation, and real-world applications; e.g., California electricity crisis.

### **130. Public Microeconomics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or Agricultural and Resource Economics 100A and 100B, or consent of instructor. Public expenditures; theory and applications. Efficiency and equity of competitive markets; externalities, public goods, and market failures; positive and normative aspects of public policy for expenditure, including benefit-cost analysis. Topics include consumer protection, pollution, education, poverty and crime.

### **131. Public Finance (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or Agricultural and Resource Economics 100A and 100B. Economic burden of taxation; equity and efficiency considerations in tax design; structure and economic effects of the U.S. tax system (including personal income tax, corporation income tax, and property tax); tax loopholes; recent developments; tax reform proposals. Offered irregularly.

### **132. Health Economics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or Agricultural and Resource Economics 100A and 100B; one course from list: course 102, course 140, Agricultural and Resource Economics 106 or Statistics 108; consent of instructor. The health care market, emphasizing the role and use of economics. Individual demand, provision of services by doctors and hospitals, health insurance, managed care and competition, the role of government access to health care.—W. (W.) Cameron

### **133Y. Poverty, Inequality and Public Policy (4)**

Web virtual lecture—2 hours; discussion—2 hours. Prerequisite: course 1A or 1B. Class size limited to 99; 3 sections of 33 each. Examination of the economics of poverty and inequality in the United States, including measurement, trends, and related policies.—Stevens

### **134. Financial Economics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, and 100 or Agricultural and Resource Economics 100A and 100B; Mathematics 16A or 17A or 21A; Statistics 13. General background and rationale of corporation; finance as resource allocation over time; decision making under uncertainty and the role of information; capital market and interest rate structure; financial decisions. Students who have completed Agricultural and Resource Economics 171A may not receive credit for this course.

### **135. Money, Banks and Financial Institutions (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or (Agricultural and Resource Economics 100A and 100B), course 101; Statistics 13. Banks and the banking system. Uncertainty and asymmetric information in the lending process; efficiency of competitive equilibrium in lending markets. Regulation and the conduct of monetary policy.

### **136. Topics in Macroeconomic Theory (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 101. Advanced Topics in macroeconomics theory. The course develops the theoretical and empirical analysis of a specific field of macroeconomics. Possible topics include, business cycle theories, growth theory, monetary economics, political economics and theories of unemployment and inflation.

### **137. Macroeconomic Policy (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or (Agricultural and Resource Economics 100A and 100B), course 101; Statistics 13. Theory and practice of macroeconomic policy, both monetary and fiscal.

### **140. Econometrics (4)**

Lecture—3 hours; discussion—1 hours. Prerequisite: course 102, course 100 and course 101; Mathematics 16A and 16B or Mathematics 21A and 21B; Statistics 13, or any upper division Statistics course. Problems of observation, estimation and hypotheses testing in economics through the study of the theory and application of linear regression models. Critical evaluation of selected examples of empirical research. Exercises in applied economics. Not open for credit to students who have enrolled in or completed Agricultural and Resource Economics 106.

### **145. Transportation Economics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or (Agricultural and Resource Economics 100A, 100B); Mathematics (16A, 16B) or (17A, 17B); Statistics 13, course 102, 140, Agricultural and Resource Economics 106 or Statistics 108, or consent of instructor. Intended for advanced Economics undergraduates. Examination of fundamental problems of planning and financing transportation "infrastructure" (roads, ports, airports). The economics of the automobile industry, as well as the impact of government regulation and deregulation in the airlines and trucking industries. Offered irregularly.

### **151A. Economics of the Labor Market (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or Agricultural and Resource Economics 100A and 100B. Theory of labor supply and demand; determination of wages and employment in the labor market. Policy issues: labor force participation by married women; minimum wages and youth unemployment; effect of unions on wages.

### **151B. Economics of Human Resources (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or Agricultural and Resource Economics 100A and 100B. Human resource analysis; introduction to human capital theory and economics of education; the basic theory of wage differentials, including theories of labor market discrimination; income distribution; poverty. Policy issues; negative income tax; manpower training programs; incomes policy.

### **152. Economics of Education (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or (Agricultural and Resource Economics 100A and 100B), course 102; Mathematics 16B or 17B or 21B; Statistics 13 or 32, with grade of C- or better in each course, or consent of the instructor. Application of theoretical and empirical tools of economics to the education sector. Demand for Education; Education Production and Market Structures in Education. Policy applications: class size reduction, school finance equalization, accountability, and school choice. Offered irregularly.

### **160A. International Microeconomics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or Agricultural and Resource Economics 100A and 100B, or consent of instructor. International trade theory: impact of trade on the domestic and world economies; public policy toward external trade. Only two units of credit allowed to students who have completed course 162.

### **160B. International Macroeconomics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, 100 or (Agricultural and Resource Economics 100A and 100B), course 101, or consent of instructor. Balance of payments adjustment mechanism, international monetary economics issues; international financial institutions and their policies. Only two units of credit allowed to students who have completed course 162.

### **162. International Economic Relations (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. International trade and monetary relations, trade policy, exchange rate policy, policies toward international capital migration and investment. Emphasis on current policy issues. Course intended especially for non-majors. Not open for credit to students who have completed course 160A or 160B. GE credit: SocSci | SS, WC.

### **171. Economy of East Asia (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Intensive reading, discussion and research on selected topics from the economies of the countries of East Asia. Consult department for course scheduling.

### **190. Topics in Economics (4)**

Lecture/discussion—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Selected topics in economic analysis and public policy. Variable content. May be repeated for credit.

### **190X. Upper Division Seminar (1-4)**

Seminar—1-4 hours. Prerequisite: courses 100 and 101, and consent of the instructor. In-depth examination at an upper division level of a special topic in Economics. Emphasis on focused analytical work.

### **192. Internship (1-6)**

Internship—3-18 hours. Prerequisite: upper division standing; consent of instructor. Internship experience off and on campus in all subject areas offered in the Department of Economics. Supervised by a member of the staff. May be repeated for credit. (P/NP grading only.) GE credit: SE.

### **194HA. Special Study for Honors Students (4)**

Independent study—3 hours; seminar—1 hour. Prerequisite: major in Economics with senior standing; consent of instructor and completion of 135 units with a minimum GPA of 3.500 in courses counted toward the major. A program of research culminating in the writing of a senior honors thesis under the direction of a faculty adviser. (Deferred grading only, pending completion of course.)

### **194HB. Special Study for Honors Students (4)**

Independent study—3 hours; seminar—1 hour. Prerequisite: major in Economics with senior standing; consent of instructor and completion of 135 units with a minimum GPA of 3.500 in courses counted toward the major. A program of research culminating in the writing of a senior honors thesis under the direction of a faculty adviser. (Deferred grading only, pending completion of course.)

### **197T. Tutoring in Economics (1-5)**

Tutorial—3-15 hours. Prerequisite: consent of instructor and chairperson. Undergraduates assist the instructor by tutoring students in one of the department's regularly scheduled courses. May be repeated for up to 10 units of credit. (P/NP grading only.)

### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

### **Graduate**

### **200A. Microeconomic Theory (5)**

Lecture—4 hours; discussion—1 hour. Prerequisite: graduate standing. Linear and non-linear optimization theory applied to develop the theory of the profit-maximizing firm and the utility-maximizing consumer. (Same course as Agricultural and Resource Economics 200A.)

### **200B. Microeconomic Theory (5)**

Lecture—4 hours; discussion—1 hour. Prerequisite: course 200A. Characteristics of market equilibrium under perfect competition, simple monopoly and monopsony. Emphasis on general equilibrium and welfare economics; the sources of market success and market failure. (Same course as Agricultural and Resource Economics 200B.)

### **200C. Microeconomic Theory (5)**

Lecture—4 hours; discussion—1 hour. Prerequisite: course 200B. Uncertainty and information economics. Individual decision making under uncertainty. Introduction to game theory, with emphasis on applications to markets with firms that are imperfect com-

petitors or consumers that are imperfectly informed. (Same course as Agricultural and Resource Economics 200C.)

#### **200D. Macroeconomic Theory (5)**

Lecture—4 hours; discussion—1 hour. Prerequisite: course 101, Mathematics 21A, 21B, and 21C. Macro static theory of income, employment, and prices.

#### **200E. Macroeconomic Theory (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200B (may be taken concurrently) and 200D. Macrodynastic theory of income, employment, and prices.

#### **201A. History of Economic Thought (4)**

Lecture—3 hours; discussion—1 hour. Economic thought from the classical Greece era to modern times. Offered in alternate years.

#### **201B. History of Economic Thought II (4)**

Lecture—3 hours; discussion—1 hour. Origins and emergence of modern economic analysis. Offered in alternate years.

#### **203A. Advanced Economic Theory (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A; 200B. Advanced topics in general equilibrium theory and welfare economics: existence, determinateness and efficiency; intertemporal economies; uncertainty.—W. (W.) Quinzi

#### **203B. Advanced Economic Theory: Game Theory (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A, 200B, 200C. Covers the most recent developments in game theory, with the focus changing from year to year. Main topics are: refinements of Nash equilibrium, repeated games, evolution, social situations, bounded rationality, and bargaining theory.—S. (S.) Schipper

#### **203C. Topics in Economic Theory (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A, 200B, 200C. Selected topics in contemporary microeconomic theory. May be repeated for credit with the consent of the Graduate Studies Committee.

#### **210A. Economic History (4)**

Lecture/discussion—4 hours. Economic history of the eastern hemisphere in the modern period. Medieval Europe or other regions may be studied, depending on student interest.

#### **210B. Economic History (4)**

Lecture/discussion—4 hours. The United States from Colonial times to the present. Other areas of the western hemisphere may be studied, according to student interest.

#### **210C. Economic History (4)**

Seminar—4 hours. Prerequisite: a graduate course in economic history. Selected topics and issues, emphasis on current research. (Quarter offered to be flexible.)—W. (W.) Meissner

#### **214. Development Economics (4)**

Lecture—4 hours. Prerequisite: Agricultural and Resource Economics 100A, 100B, course 101; Agricultural and Resource Economics/Economics 204 and course 160A-160B recommended. Review of the principal theoretical and empirical issues whose analysis has formed development economics. Analysis of economic development theories and development strategies and their application to specific policy issues in developing country contexts. (Same course as Agricultural and Resource Economics 214.)

#### **215A. Microdevelopment Theory and Methods I (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A or 204; course 240A recommended. Agricultural development theory, with a focus on microeconomics. Agricultural household behavior with and without market imperfections and uncertainty. Analysis of rural land, labor, credit and insurance markets, institutions, and contracts. (Same course as Agricultural and Resource Economics 215A.)

#### **215B. Open Macroeconomics of Development (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural and Resource Economics/Economics 200A or 204, 200D or 205, and 214 or 215A. Models and policy approaches regarding trade, monetary and fiscal issues, capital flows and debt are discussed in the macroeconomic framework of an open developing country. The basic analytical focus is real exchange rate and its impact on sectoral allocation of resources. (Same course as Agricultural and Resource Economics 215B.)

#### **215C. Microdevelopment Theory and Methods II (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 215A. Extension of development theory and microeconomic methods. Agricultural growth and technological change; poverty and income inequality; multisectoral, including village and regional models. Computable general equilibrium methods and applications. (Same course as Agricultural and Resource Economics 215C.)

#### **215D. Environment and Economic Development (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 200A, 204 or Agricultural and Resource Economics 275. Interdisciplinary course drawing on theoretical and empirical research on interactions between environmental resource use and economic development processes. Analysis of issues emerging at the interface of environmental and development economics. (Same course as Agricultural and Resource Economics 215D.) Offered irregularly.

#### **221A. The Theory of Industrial Organization (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A, 200B, 200C. Game theory is used to analyze strategic interaction of firms in industries. Topics include models of competition, product differentiation, entry-deterring strategies, contractual arrangements, vertical control and antitrust issues. Offered irregularly.

#### **221B. Empirical Analysis in Industrial Organization (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 221A and 240B. Recent empirical work in industrial organization. Topics include empirical analysis of cartels, product differentiation, innovation and technological change, and imperfect competition in international markets. Offered irregularly.

#### **221C. Industrial Organization and Regulation (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 221A and 240B. Optimal regulation of natural monopoly. Topics include regulatory mechanisms for single and multiple output firms under symmetric and asymmetric information, optimality without regulation, the economic theory of regulation, and empirical studies of regulation and deregulation.

#### **230A. Public Economics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200C. Measures of deadweight loss and consumer surplus; optimal commodity and income taxation; tax incidence; policy issues in personal taxation, corporate taxation, and social insurance; the evaluation of effective tax rates.

#### **230B. Public Economics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 240A, 240B. Effects of government policies on economic behavior; labor supply, program participation, investment, consumption and savings. Offered irregularly.

#### **230C. Public Economics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200C and 240B. Advanced topics in economics of the public sector, with emphasis on current research. Topics may vary from year to year.

#### **235A. Macroeconomics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200D or consent of instructor. Frontiers of applied/empirical macroeconomics. Evidence and

lessons from macroeconomic history for The Great Depression, financial crises, efficient markets, parity conditions, capital flows, default, financial crises, exchange rates, growth, and other current empirical research topics.—F. (F.) Taylor

#### **235B. Macroeconomics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200D or consent of instructor. Search theory, theory of real-world markets characterized by search frictions, with applications: Labor economics: models of unemployment and wages differentials; Financial economics: determination of asset prices in OTC financial markets; Monetary Economics: foundations for money as a medium of exchange.—W. (W.) Geromichalos

#### **235C. Macroeconomics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200D or consent of instructor. Basic numerical methods for analytically intractable problems in economics. Techniques presented applicable in a wide range of fields including macroeconomics, econometrics, resource economics, labor economics, economic theory, international trade, finance, game theory, public finance, contract theory, and others.—S. (S.) Henriksen

#### **239. Econometric Foundations (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing or consent of instructor. The course will prepare students for econometric theory and empirical work by examining the statistical foundation of econometrics. Special attention is paid to problems specific to non-experimental data common to social sciences. Topics from matrix algebra are also covered. (Same course as Agricultural & Resource Economics 239.)—F. (F.)

#### **240A. Econometric Methods (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 133 and a course in linear algebra or the equivalent. Least squares, instrumental variables, and maximum likelihood estimation and inference for single equation linear regression model; linear restrictions; heteroskedasticity; autocorrelation; lagged dependent variables. (Same course as Agricultural and Resource Economics 240A.)

#### **240B. Econometric Methods (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 240A. Topics include asymptotic theory and instrumental variables, pooled time-series cross-section estimation, seemingly unrelated regression, classical hypothesis tests, identification and estimation of simultaneous equation models, cointegration, error-correction models, and qualitative and limited dependent variable models. (Same course as Agricultural and Resource Economics 240B.)

#### **240C. Time Series Econometrics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B or consent of instructor. Probability theory; estimation, inference and forecasting of time series models; trends and non-standard asymptotic theory; vector time series methods and cointegration; time series models for higher order moments and transition data; state-space modeling and the Kalman filter. (Same course as Agricultural and Resource Economics 240C.)—W. (W.)

#### **240D. Cross Section Econometrics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B or consent of instructor. Estimation and inference for nonlinear regression models for cross-section data; models for discrete data and for limited dependent variables; models for panel data; additional topics such as bootstrap and semiparametric regression. (Same course as Agricultural and Resource Economics 240D)—F. (F.)

#### **240E. Topics in Time Series Econometrics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 240C or consent of instructor. Modern econometric techniques for time series data. Expand on topics covered in Economics 240A, 240B and 240C. Contents may vary from year to year. (Same course as Agricultural and Resource Economics 240E.) Offered irregularly.

**240F. Topics in Cross Section Econometrics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 240D or consent of instructor. Modern econometrics techniques for cross-section data. Expand on topics covered in Economics 240A, 240B and 240D. Contents may vary from year to year. (Same course as Agricultural and Resource Economics 240F.) Offered irregularly.

**250A. Labor Economics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 150A-150B or the equivalent. Philosophy, theory and history of American and foreign labor movements; union structure, organization and collective bargaining under changing labor market conditions; current labor market issues.—F. (F.) Stevens

**250B. Labor Economics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 151A or consent of instructor; course 204 or 200A recommended. Microeconomic theory of labor supply and labor demand, estimation of labor supply and demand functions; human capital theory; labor market analysis.—W. (W.) Page

**260A. International Economics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A or 204. Theory of trade determinants; gains from trade; tariffs and effective protection; economic unions.

**260B. International Economics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 200D and 200E. Balance of payments adjustment mechanisms; foreign exchange markets' theories of balance of payments policy and international monetary mechanisms. Offered irregularly.

**260CN. International Investment and Trade (4)**

Seminar—4 hours. Prerequisite: course 260A. Analysis of foreign investment and its links to trade; theories of the firm as they relate to firm's export and investment decisions; and an introduction to the political economy of trade policies.

**260D. Topics in International Macroeconomics (4)**

Seminar—4 hours. Prerequisite: course 260B or consent of instructor. Survey of current literature in international macroeconomic theory. Offered irregularly.

**260E. Topics in International Trade (4)**

Seminar—4 hours. Prerequisite: course 260A, 260B. Current literature in international trade theory.

**260F. International Macroeconomic Policy (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 260B. Theory and practice of international macroeconomic policy. Topics include exchange rate regimes, international financial institutions, crises and current topics.

**270A. Economics of Growth (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200D and 200E. Modern theories and empirics of economic growth beginning with the neoclassical theories up to current endogenous growth models. Emphasis on the analysis of human capital and growth, technological innovation, its diffusion and empirical evidence on growth.

**270B. Economics of Growth (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200D and 200E. Empirical analysis of growth patterns and growth models. Emphasis on the relationship between macroeconomic management and long-term growth; the use of foreign capital in accelerating growth and its occasional mishaps; the comparison of growth performance in East Asia and Latin America since WW2; the experiences of centrally-planned economies and transitions to market-based growth; and the transformation from an industrial economy to a knowledge economy.

**270C. Economics of Growth (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200D and 200E. Institutional bases; politics; contracts and commitment; money and finance; malthusian dynamics; modern economic growth; transi-

tion of industrialization; dual economies, core and periphery; sources of convergence and divergence; openness and growth; resources, demography, and geography; institutions, imperialism, and class conflicts.

**280. Orientation to Economic Research (2)**

Discussion—2 hours. Course tries to bridge the gap between students' classwork and their subsequent research. It deals with topics such as the origination of a research project, some mechanics of empirical research and hints on the submission of research papers. (S/U grading only.)

**290. Topics in Economics (4)**

Seminar—4 hours. Prerequisite: consent of instructor. Selected topics in economic analysis and public policy, focusing on current research. May be repeated for credit.

**291. Contemporary Economics Seminar (2)**

Seminar—2 hours. Prerequisite: graduate standing in Economics. Seminar series on topics of current interest. May be repeated for credit. (S/U grading only.)—F. S. (F, S.)

**298. Group Study (1-5)**

Discussion—1.5 hours. Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

**299. Individual Study (1-12)**

Prerequisite: consent of instructor and graduate standing. (S/U grading only.)

**299D. Dissertation Research (1-12)**

(S/U grading only.)

**Professional****397. Teaching of Economics (2)**

Lecture/discussion—2 hours. Prerequisite: graduate standing in economics. Teaching of economics: methods of instruction, organization of courses, examination and evaluation procedures. (S/U grading only.)

**Education, School of**

\_\_\_\_\_, Ph.D., Dean

Cynthia Carter Ching, Ph.D., Associate Dean for Academic Programs and Instruction

Peter C. Mundy, Ph.D., Associate Dean for Academic Personnel and Research

530-752-8258; Fax 530-754-8019

<http://education.ucdavis.edu>

**Faculty**

Jamal Abedi, Ph.D., Professor

Rebecca C. Ambrose, Ph.D., Professor

Steven Z. Athanases, Ph.D., Professor

Heidi L. Ballard, Ph.D., Associate Professor

Cynthia Carter Ching, Ph.D., Associate Professor

Marcela Cuellar, Ph.D., Assistant Professor

Kerry Enright, Ph.D., Associate Professor

Christian Faltis, Ph.D., Professor, Director of Teacher Education

Kevin A. Gee, Ed.D., Assistant Professor

Cristina Gonzalez, Ph.D., Professor

Cassandra M. D. Hart, Ph.D., Assistant Professor

Paul E. Heckman, Ph.D., Professor

Pauline V. Holmes, Ph.D., Lecturer, Supervisor of Teacher Education

Michal Kurlaender, Ed.D., Associate Professor

Michele Fortes, Ph.D., Lecturer, Supervisor of Teacher Education

Harold G. Levine, Ph.D., Professor

Lee M. Martin, Ph.D., Associate Professor

M. Lynn Martindale, Ed.D., Lecturer, Supervisor of Teacher Education

Danny C. Martinez, Ph.D., Assistant Professor

Francisco "Paco" Martorell, Ph.D., Assistant Professor

Alvin M. Mendle, M.A., Lecturer, Supervisor of Teacher Education

Peter C. Mundy, Ph.D., Professor

Cynthia Passmore, Ph.D., Professor

Alexis D. Patterson, Ph.D., Assistant Professor

J. Richard Pomeroy, Ph.D., Lecturer, Supervisor of Teacher Education

Patricia Quijada, Ph.D., Associate Professor

Gloria M. Rodriguez, Ph.D., Associate Professor

Rebecca Rosa, M.A., Lecturer, Supervisor of Teacher Education

Heather M. Rose, Ph.D., Associate Professor

Emily J. Solaro, Ph.D., Associate Professor

Cary J. Trexler, Ph.D., Professor

Yuuko Uchikoshi Tonkovich, Ed.D., Associate Professor

Matt Wallace, Ph.D., Lecturer, Supervisor of Teacher Education

Karen A. Watson-Gegeo, Ph.D., Professor

Megan E. Welsh, Ph.D., Assistant Professor

Tobin F. White, Ph.D., Associate Professor

**Emeriti Faculty**

Donald G. Arnstine, Ph.D., Professor Emeritus

G. Phillip Cartwright, Ph.D., Professor Emeritus

Concha Delgado-Gaitan, Ph.D., Professor Emeritus

Sharon Dugdale, Ph.D., Professor Emeritus

Richard A. Figueredo, Ph.D., Professor Emeritus

Barbara G. Goldman, Ph.D., Professor Emeritus

Barbara J. Merino, Ph.D., Professor Emeritus

Douglas L. Minnis, Ed.D., Lecturer Emeritus

Sandra M. Murphy, Ph.D., Professor Emeritus

Jonathan H. Sandoval, Ph.D., Professor Emeritus

Julius M. Sassenrath, Ph.D., Professor Emeritus

Carlton J. Spring, Jr., Ph.D., Professor Emeritus

Thomas B. Timar, Ph.D., Professor Emeritus

Jon. C. Wagner, Ph.D., Professor Emeritus

David R. Wampler, Ph.D., Lecturer Emeritus

George D. Yonge, Ph.D., Professor Emeritus

I. Phillip Young, Ph.D., Professor Emeritus

**Center for Applied Policy in Education (CAP-ED)**

\_\_\_\_\_, Director

Tina Murdoch, Assistant Director

530-752-1533

**Resourcing Excellence in Education (REED)**

Susan O'Hara, Executive Director  
916-425-1987

Arthur Beauchamp, Senior Director  
530-752-5876

Joanne Bookmyer, Senior Director  
530-574-5189

Renee Newton, Senior Director  
530-754-4319

**Edward Teller Education Center (ETEC)**

925-422-5059

**Sacramento Area Science Project (SASP)**

Cynthia Passmore, Director  
530-752-7883

**Student Services Office**

106 School of Education Building  
530-752-5887; Fax 530-754-6672  
[eduadvising@ucdavis.edu](mailto:eduadvising@ucdavis.edu)

MaryAnn Mellor, Senior Director, Student Support Services, Outreach and Recruitment  
530-752-0761

**Minor in Education**

Program Coordinator: 530-752-2367

**Graduate Group in Education (Ph.D.)**

Michal Kurlaender, Graduate Group Chair  
Program Coordinator: 530-752-7259

**Capital Area North Doctorate in Educational Leadership (CANDEL)**

Gloria Rodriguez, Ph.D., Director  
Program Coordinator: 530-754-6664

## Master of Arts in Education

Cynthia Carter Ching, Program Chair  
Program Coordinator: 530-752-7259

## Teacher Education-Credential

Cynthia Carter Ching, Program Chair  
Rebecca Ambrose, Co-Director of Teacher Education  
Christian Faltis, Co-Director of Teacher Education  
Associate Director of Teacher Education  
Program Coordinator: 530-752-0758

## Minor Program Requirements:

The UC Davis School of Education is committed to developing informed citizens and advocates for productive educational environments in a democratic society. Education courses are designed for undergraduate students from all majors.

A Minor in Education will help students:

- Develop an understanding of the issues and concerns of public and private education
- Complete prerequisites for the teaching credential program
- Work towards a master's degree or doctoral degree in education or related field
- Seek employment in policy, advocacy, or other education related careers

**Courses.** Students must complete 20 units the Minor program in Education. At least 12 units of the 20-unit minimum for the minor must be in Education. The remaining units for the minor may be in education or a related field as approved on the electives list.

## Minor Program Requirements:

	UNITS
<b>Upper Division Required Courses .....</b>	<b>12</b>
Education 100, 110, 120.....	12

<b>Elective Courses .....</b>	<b>8</b>
The remaining eight units may be taken from the following courses:	
Education 115, 181 .....	2
Education 183 .....	3
Education 114, 119, 121, 122, 130, 142, 147, 150, 152, 173, 185.....	4
Education 192, 198 .....	variable

## Approved Courses Outside of Education

Agricultural Education 100.....	3
Chicano Studies 192.....	1-3
Mathematics 197TC* .....	1-5
University Writing Program 197TC* .....	2-4
African American & African Studies 130; American Studies 152; Asian American Studies 101; Biological Sciences 195A or B*; Chicano Studies 132; Economics 152; Human Development 100A, 100B, 101; Linguistics 173, 180; Psychology 130, 132, 141; Sociology 124; Spanish 116, 117; University Writing Program 104D .....	4
* Internship (192, 195A or B, 195TC, 197TC, 198,) and Independent Study (199), or a combination of both, may not exceed a total of four units. Elective courses may include only one internship.	

**Minor Advisers.** A designated faculty member in the School of Education may advise students and give final approval on the minor. For additional information contact the Student Services office in School of Education Building.

## Courses in Education (EDU)

### Lower Division

#### 81. Learning in Science and Mathematics (2)

Lecture/discussion—2 hours; field work—2 hours. Limited to 26 students per section. Exploration of how students learn and develop understanding in science and mathematics classrooms. Introduction to case studies and interview techniques and their use in K-6 classrooms to illuminate factors that affect stu-

dent learning. (Same course as Geology 81.) (P/NP grading only.) GE credit: SS, VL, WE.—F, W, S. (F, W, S.) Latimer, Mendale, Stevenson

#### 92. Internship (1-3)

Internship—3-9 hours. Prerequisite: consent of instructor. Enrollment dependent on availability of intern placements. Internship as a teacher's aide or tutor in K-12 classrooms under the supervision of a faculty member. May be repeated for credit. (P/NP grading only.)

#### 98. Directed Group Study (1-5)

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

### Upper Division

#### 100. Introduction to Schools (4)

Lecture—3 hours; field work—3 hours. Study of occupational concerns of teachers; skills for observing classroom activities; school organization and finance; school reform movement; observing, aiding, and tutoring in schools. GE credit: ACGH, DD, OL, SS.—F, W, S. (F, W, S.) Ambrose, Faltis, Martini, Patterson, Trexler, Tonkovich

#### 110. Educational Psychology: General (4)

Lecture/discussion—4 hours. Learning processes, cognitive development, individual differences, testing and evaluation. GE credit: SocSci, Wrt | SS, WE.—F, W, S. (F, W, S.) Ching, Martin, Mundy, Passmore, Quijada, Solari, Tonkovich, White

#### 114. Quantitative Methods in Educational Research (4)

Lecture/discussion—4 hours. Problems and methods in data analysis. Design of research projects. Some consideration of procedures suited to digital computers. GE credit: QL.—F. (F.) Martin

#### 115. Educating Children with Disabilities (2)

Lecture—2 hours. Educational issues and processes involved in teaching children with disabilities. The course will focus on the structure of special education, with an emphasis on meeting the educational needs of children who are mainstreamed in regular classes. GE credit: SocSci | SS.—F, S. (F, S.) Mundy, Solari

#### 119. The Use and Misuse of Standardized Tests (4)

Lecture—3 hours; discussion—1 hour. Principles underlying educational and psychological testing. Purposes of testing for individual achievement and evaluation of school programs. Interpretation and misinterpretations of outcomes. Analysis of SAT, GRE and other common tests. Experience in test administration and outcome interpretation. GE credit: SocSci, Wrt | QL, SS, WE.—W, S. (W, S.) Abedi, Welsh

#### 120. Philosophical and Social Foundations of Education (4)

Lecture—3 hours; discussion—1 hour. Philosophical, historical, and sociological study of education and the school in our society. GE credit: SocSci, Wrt | SS, WE.—F, W, S. (F, W, S.) Gee, Hart, Kurlaender

#### 121. Introduction to Education Policy Analysis: Tools, Methods and Frameworks (4)

Lecture—3 hours; discussion—1 hours. Introduces students to the field of education policy analysis with a specific emphasis on the quantitative frameworks and analytical tools drawn primarily from economics and statistics that are used to guide and inform educational policymaking. GE credit: SocSci | QL, SS.—F, W, S. (F, W, S.)

#### 122. Children, Learning and Material Culture (4)

Lecture/discussion—3 hours; extensive writing or discussion—1 hour; fieldwork. Prerequisite: consent of instructor. How material artifacts shape what and how children learn in school, at home, and in the community. Artifacts examined include books, computers, household appliances, toys and games, entertainment media, collectibles, sports equipment, clothing, folk arts and crafts, and neighborhood

space. Offered in alternate years. GE credit: SocSci, Div, Wrt | SS, VL, WE.—F, S. (F, S.) Watson-Gegeo, White

#### 130. Issues in Higher Education (4)

Discussion—3 hours; field work—3 hours. Prerequisite: consent of instructor. Analysis of current issues in higher education and of some practical implications of varying philosophical approaches to the role of the university. GE credit: SocSci | SS, WE.—F, S. (F, S.) Cuellar, Gonzalez

#### 142. Introduction to Environmental Education (4)

Lecture—3 hours; field work. Study of history, philosophy, principles and approaches to environmental education (EE) and outreach; learning theories, teaching strategies and techniques in EE and outreach; evaluation of EE curricula in non-formal and in-school contexts; observing, aiding and facilitating local environmental education programs. GE credit: SocSci | OL, SS.—S. (S.) Ballard

#### 147. Anglos, Latinos and the Spanish Black Legend: The Origins and Educational Implications of Anti-Hispanic Prejudice (4)

Lecture/discussion—3 hours; field work; term paper. Examination of anti-Hispanic prejudice in the United States focusing on the "Black Legend," a 16th Century anti-Spanish myth underpinning the doctrine of "Manifest Destiny." Exploration of the Legend's presence in contemporary American society through interviews and analysis of school textbooks. (Same course as Spanish 147.) Offered in alternate years. GE credit: ArtHum, Div, Wrt | ACGH, AH, DD, WE.—(F.) González

#### 150. Cultural Diversity and Education in a Sociopolitical Context (4)

Lecture/discussion—4 hours; extensive writing. Introduction to cultural diversity and education in a socio-political context. Interactive course. Small and large-group discussions explore, extend, and apply readings; range of writing genres for responses to assignments and course themes; lectures, slide shows, speakers, brief fieldwork, and presentations. GE credit: SocSci | SS, DD, WE.—F, W, S. (F, W, S.) Athanases, Enright, Martinez

#### 151. Language Development in the Chicano Child (3)

Lecture/discussion—3 hours. Bilingualism, first and second language acquisition, bilingual education, language assessment, Chicano Spanish and the role of dialect varieties in the classroom. Not open for credit to students who have completed course 151T. Offered irregularly.

#### 151T. Language Development in the Chicano Child (3)

Lecture/discussion—3 hours. Prerequisite: acceptance in Teaching Credential Program. Open to UC Davis Teacher Credential candidates only. Bilingualism, first and second language acquisition, bilingual education, language assessment, Chicano Spanish and the role of dialect varieties in the classroom. Not open for credit to students who have completed course 151.—F. (F.)

#### 152. Academic Spanish for Bilingual Teachers (3)

Lecture/discussion—3 hours; field work. Prerequisite: Acceptance in Teaching Credential Program or consent of instructor. Communicative class taught in Spanish focused on the development of Spanish communication skills for current and/or future bilingual teachers. Main topics are related to school content areas in bilingual settings, with an emphasis on standard and Southwest Spanish dialects. Restricted to Spanish speaking students. GE credit: ArtHum or SocSci | AH or SS, OL, WE.—W. (W.) Fortes, Rosa

#### 153. Diversity in the K-12 Classroom (2)

Lecture/discussion—2 hours. Prerequisite: acceptance in Teaching Credential Program. Analysis of research on learning styles among culturally diverse students with review and evaluation of responsive curricula and classroom teaching techniques. The ethnographic interview as a research tool.—F. (F.) Fortes, Rosa

**160A. Introduction to Peer Counseling (2)**

Lecture/discussion—2 hours. Prerequisite: consent of instructor. Introduction to peer counseling techniques and development of peer counseling skills. Offered irregularly. (P/NP grading only.)

**160B. Issues in Peer Counseling (2)**

Lecture/discussion—2 hours. Prerequisite: consent of instructor. In-depth review and development of skills for specific counseling topics. May be repeated one time for credit when topic differs. Offered irregularly. (P/NP grading only.)

**163. Guidance and Counseling (4)**

Lecture—4 hours. Nature and scope of pupil personnel services; basic tools and techniques of guidance; theory and practice of counseling psychology, with emphasis on educational and vocational adjustment. Offered irregularly.

**173. Language Development (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Linguistics 1 or consent of instructor; Linguistics 103A, 103B. Theory and research on children's acquisition of their native language, including the sound system, grammatical systems, and basic semantic categories. (Same course as Linguistics 173.) GE credit: SocSci | SS. —F. (F.) Tonkovich

**180A. Computers in Education (3)**

Lecture/discussion—1 hour; laboratory—2 hours; project—3 hours. Prerequisite: acceptance in Teacher Credential Program. Restricted to Teaching Credential Majors. Applications of computers in education as instructional, intellectual, and communication tools. (Deferred grading only, pending completion of sequence.) —F. (F.)

**180B. Computers in Education (3)**

Lecture/discussion—1 hour; laboratory—2 hours; project—3 hours. Prerequisite: acceptance in Teacher Credential Program; successful completion of course 180A. Restricted to Teaching Credential Majors. Applications of computers in education as instructional, intellectual, and communication tools. (Deferred grading only, pending completion of sequence.) —W. (W.) Pomeroy, White

**180C. Computers in Education (3)**

Lecture/discussion—1 hour; laboratory—2 hours; project—3 hours. Prerequisite: acceptance in Teacher Credential Program; successful completion of course 180B. Restricted to Teaching Credential Majors. Applications of computers in education as instructional, intellectual, and communication tools. (Deferred grading only, pending completion of sequence.) —S. (S.) Pomeroy, White

**181. Teaching in Science and Mathematics (2)**

Lecture/discussion—2 hours; field work—2 hours. Prerequisite: major in mathematics, science, or engineering; or completion of a one-year sequence of science or calculus and consent of the instructor. Class size limited to 40 students per section. Exploration of effective teaching practices based on examination of how middle school students learn math and science. Selected readings, discussion and field experience in middle school classrooms. (Same course as Geology 181.) (P/NP grading only.) GE credit: SS, WE. —F, W, S. (F, W, S.) Horn

**182. Computer Project for Curricular Integration (1)**

Seminar—1 hour. Prerequisite: consent of instructor. Design and implementation of a curricular unit to integrate computer technology into a K-12 classroom setting. A project-based seminar intended for students with substantial prior experience with instructional use of computers and related technologies. Not open for credit to students who have completed course 180 or 181. Offered irregularly.

**183. Teaching High School Mathematics and Science (3)**

Lecture/discussion—2 hours; field work. Prerequisite: course 81/Geology 81 or course 181/Geology 181 and major in mathematics/science or engineering; or completion of a one-year sequence of science or calculus and consent of the instructor. Limited to 40 students per section. Exploration and

creation of effective teaching practices based on examination of how high school students learn mathematics and science. Field experience in high school classrooms. (Same course as Geology 183.) GE credit: SocSci | OL, SS, WE. —F, W, S. (F, W, S.) Stevenson

**185. Learning in a Digital Age: Information, Schooling, and Society (4)**

Lecture/discussion—2 hours; lecture/laboratory—2 hours. Focus on the changing nature of learning in a digital age: social media, ubiquitous connectivity, online education, electronic communication, writing, gaming, and youth culture. Readings will be drawn from major recent works detailing fundamental shifts in information, schooling, and society. Offered in alternate years. GE credit: SocSci | OL, VL, SS. —(S.) Ching

**192. Internship (1-3)**

Internship—2-8 hours; discussion—1 hour. Prerequisite: consent of instructor. Internship as a tutor, teacher's aide, or peer counselor in a school or educational counseling setting under the supervision of a faculty member. May be repeated for credit. (P/NP grading only.) —F, W, S. (F, W, S.)

**197T. Tutoring in Education (1-2)**

Tutoring—1-2 hours. Prerequisite: consent of instructor. Leading of small voluntary discussion groups affiliated with the School's upper division courses under the supervision of, and at the option of, the course instructor, who will submit a written evaluation of the student's work. May be repeated one time for credit for a total of 4 units. (P/NP grading only.) Offered irregularly.

**198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. Offered irregularly. (P/NP grading only.)

**Graduate****200. Educational Research (4)**

Lecture—2 hours; discussion—2 hours. Prerequisite: introductory statistics or consent of instructor. Defining educational research questions, reviewing relevant literature, developing research designs, developing research instruments, selecting appropriate data analysis procedures, and writing research projects. A case problem will provide practice in designing and reporting research. —F. (F.) Solar, Welsh

**201. Qualitative Research in Education (4)**

Seminar—2 hours; lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Examines the design and conduct of educational research using non-numerical data (e.g., text, discourse, imagery and artifacts). Focuses on issues (e.g., validity, reliability, generalizability, ethics) and reporting genres (e.g., narrative accounts, case studies, and arguments). —W. (W.) Enright

**202N. Computer Analysis of Qualitative Data (4)**

Seminar—3 hours; laboratory—2 hours. Critical and practical understanding of how to use computer software programs to analyze qualitative data (text, images, and videotape) in conducting social research. Offered irregularly.

**203. Educational Testing and Evaluation (4)**

Lecture/discussion—4 hours. Prerequisite: graduate standing or consent of instructor. Introduces the theoretical assumptions underlying traditional test construction, as well as the basic statistical principles involved in the design, evaluation, and interpretation of standardized tests. Also introduces the debates surrounding the uses of different kinds of tests and evaluation tools. —F, S. (F, S.) Abedi, Welsh

**204A. Quantitative Methods in Educational Research: Analysis of Correlational Designs (4)**

Discussion—2 hours; laboratory/discussion—2 hours. Prerequisite: introductory statistics or consent of instructor. Topics include multiple correlation and regression, discriminant analysis, logistic regression, and canonical correlation. Emphasis on conceptual understanding of the techniques and use of statistical software. —W. (W.) Kurlaender

**204B. Quantitative Methods in Educational Research: Experimental Designs (4)**

Discussion—2 hours; discussion/laboratory—2 hours. Prerequisite: introductory statistics or consent of instructor. Methods for analysis of experimental data in educational research. Topics include ANOVA, fixed v. random effects models, repeated measures ANOVA, analysis of co-variance, MANOVA, chi square tests, small sample solutions to t and ANOVA. —F, S. (F, S.) Abedi

**205A. Ethnographic Research in Schools I: Current Theory and Practice (4)**

Lecture—4 hours. Current literature from anthropology and society related to schools. Emphasis on the organizational structure of institutions, and the analysis of face-to-face interaction. Will explore the relationship between field-based research and theory development on the acquisition of knowledge in specific social and cultural contexts. —F. (F.) Watson-Gegeo

**205A. Ethnographic Research in Schools I: Current Theory and Practice (4)**

Lecture—4 hours. Prerequisite: graduate standing. Current literature from anthropology and society related to schools. Emphasis on the organizational structure of institutions, and the analysis of face-to-face interaction. Will explore the relationship between field-based research and theory development on the acquisition of knowledge in specific social and cultural contexts. —F. (F.) Watson-Gegeo

**205B. Ethnographic Research in Schools II: Field-Based Research Projects (4)**

Discussion—4 hours. Prerequisite: course 205A. Student research projects in specific schools with cooperative critical analysis of the design, data collection, and inferencing by researchers. Students will continue to meet with instructor as a group throughout the quarter to discuss specific projects. —W. (W.) Watson-Gegeo

**206A. Inquiry into Classroom Practice: Traditions and Approaches (2)**

Lecture/discussion—2 hours; fieldwork. Prerequisite: acceptance in Teacher Credential Program. Introduction to traditions and approaches of teachers conducting research in their own classrooms: purposes, focal areas, methods of data collection and analysis, and written genre conventions. —W. (W.) Athanases, Holmes

**206B. Inquiry into Classroom Practice: Application of Teacher Research Approaches (4)**

Lecture/discussion—3 hours; fieldwork—1 hour. Prerequisite: satisfactory completion of course 206A or consent of instructor. Open to Graduate Teaching Credential students. Analysis and application of teacher research through the development, implementation and evaluation of a short-term classroom research-based intervention. Particular attention to research that enhances learning of English language learners and under-performing students. —S. (S.) Ambrose, Athanases, Ballard, Faltis, Passmore, White

**206C. Inquiry into Classroom Practice: Study Design (4)**

Seminar—3 hours; fieldwork—1 hours. Prerequisite: satisfactory completion of course 206B or consent of instructor. Open to Graduate MA Credential students only. Proposal development for classroom-based inquiry designed to address student learning needs. Mixed methods research design and preliminary data collection approaches. Design and application of baseline student assessment for proposal

development. Literature review. Data collection in K-12 classrooms required.—F. (F.) Ambrose, Faltis, Martinez, Wallace

#### **206D. Inquiry into Classroom Practice: Data Analysis and Research Reporting (4)**

Seminar—2 hours; fieldwork—1 hour; extensive writing or discussion. Prerequisite: satisfactory completion of course 206C or consent of instructor.

Open to Graduate MA Credential students. Support of the inquiry begun in course 206C through continuous collaborative critique and feedback resulting in the writing and presentation of a research study.

Open to Graduate MA Credential students.—W. (W.) Ambrose, Faltis, Martinez, Wallace

#### **207. Concepts of the Curriculum (4)**

Lecture—2 hours; discussion—2 hours. Prerequisite: consent of instructor. Development of the skills of philosophical analysis and argument for the establishment of a point of view, in the consideration of curriculum theory and practice. Classical and contemporary approaches to subject matter and activity emphases, hidden curriculum, and moral education. Offered irregularly.

#### **208. Presenting Educational Research in Written Reports (4)**

Seminar—3 hours; extensive writing. Prerequisite: consent of instructor. Rhetorical and substantive challenges of presenting educational research through written reports; research rhetoric and genres; competing discourse conventions of educational research, policy, and practice; the social organization of publishing educational research. May be repeated one time for credit. Offered irregularly.

#### **209. Image-based Field Research (4)**

Lecture/discussion—3 hours; fieldwork—2 hours. Critical and practical understanding of video tape and still photography as resources for enhancing field research in schools and other social setting. Offered irregularly.

#### **210. The Psychology of School Learning (4)**

Lecture/discussion—4 hours. Study of human learning theory and research related to learning in school. Classical approaches of scholars such as Ausubel, Bruner, Gagné, Piaget, Vygotsky, Skinner. Review of contemporary issues of constructivism, metacognition, problem solving, learning strategies, science and mathematics learning.—S. Martin, White

#### **211. Sociocultural and Situative Perspectives on Learning and Cognition (4)**

Lecture/discussion—3 hours; extensive writing—1 hour. Sociocultural and situative theories of cognition and learning. Major ideas of L.S. Vygotsky, followed by modern perspectives: situated cognition, cognitive apprenticeship, situated learning, communities of practice, cultural-historical activity theory, and distributed cognition. Implications of each theoretical perspective for educational practice. Offered in alternate years.—(S.) Ching, White

#### **213. Individual Assessment (4)**

Lecture—4 hours. Prerequisite: introductory statistics or consent of instructor. Theories of intellectual functioning and the measurement of cognitive abilities in school-aged children. Supervised practice in administration and scoring of contemporary tests for children including the WISC-R, the WAIS-R, the Stanford-Binet, the McCarthy Scales of Children's Ability. Offered in alternate years.—W. (W.) Mundy

#### **215. Research on Achievement Motivation in Education (4)**

Seminar—3 hours; term paper. Prerequisite: consent of instructor. Analysis and critique of recent research on cognitive processes related to achievement motivation in school settings. Topics include self-determination theory, attribution theory, goal theory, intrinsic and extrinsic motivation, learned helplessness, psychological reactance, gender and culture, and research design. Offered irregularly.

#### **220. Concepts and Methods of Policy Analysis (4)**

Seminar—3 hours; fieldwork; term paper. Introduction to concepts and methods of policy analysis. Emphasis on the relationship between educational issues and problems; policy development; constructing persuasive policy analyses; issues related to policy process. Offered irregularly.

#### **221. Culture and Social Organization of Schools (4)**

Seminar—4 hours. Prerequisite: consent of instructor. Culture and social organization of schools. Examines perspectives of social researchers, educational policy-makers, and school members and their implications for educational research, policy and practice. Offered irregularly.

#### **222. School Change and Educational Reform (4)**

Lecture/discussion—2 hours; seminar—2 hours. Analysis of models, processes, and case studies of school change and educational reform with respect to variable characteristics of schools and schooling, planned and unplanned change, the moral evaluation of school change, and the role of educational research. Offered irregularly.

#### **223. Education and Social Policy (4)**

Seminar—4 hours. Prerequisite: consent of instructor. Focuses on understanding the social and political context of education in the U.S. and California and how education policy is formed in the broader public arena. Develops skills in educational policy analysis. (Former course 237.)—Hart

#### **225. Education Policy and Law (4)**

Lecture/discussion—4 hours. Examination of law as an instrument of social policy. Specific focus on the legalization of education decision making, its causes, dimensions, and effects on administrative and teacher authority. Offered irregularly.

#### **226. Culture and Social Organization of Higher Education (4)**

Seminar—3 hours; field work—1 hour. Prerequisite: consent of instructor. Critical study of culture and social organization of higher education institutions policies and functions in the U.S., with some attention to other countries. Offered irregularly.—Cuellar, Gonzalez

#### **228. Politics and Governance of Education (4)**

Seminar—3 hours; term paper. Examination of political power, representation, influence, decision-making and inter-governmental relations in the public schools. Offered irregularly.

#### **229. Education Finance Policy (4)**

Seminar—3 hours; term paper. Examination of (1) United States financing public education, (2) the relationship between school finance and education policy, and (3) the relationship between education finance and education practice. Offered irregularly.—Rose

#### **230. Special Topics in Education Policy (4)**

Seminar—3 hours; term paper. Selected topics in education policy. Designed to facilitate preparation for the qualifying examination or dissertation. Students will critically analyze scholarly work including their own works in progress. May be repeated for credit when topic differs.—F, W, S. (F, W, S.) Cuellar, Gee, Hart, Kurlaender, Martorell, Quijada

#### **235. Critical Pedagogy (4)**

Seminar—4 hours. A socio-cultural critique, from an interdisciplinary perspective, of educational reform and change. The critique will include an analysis of the influence of text content on the perpetuation of social power differences. Offered irregularly.

#### **236. Application of Hierarchical Linear Models in Education Research (4)**

Lecture—2 hours; lecture/discussion—2 hours; term paper. Prerequisite: course 204A or similar course with permission of the instructor. Application of hierarchical linear models in education research across multiple areas, such as policy, curriculum, and

assessment. Develop working knowledge of hierarchical linear modeling and an understanding of its use in existing research as well as student's work. Offered in alternate years.—(F) Gee

#### **237. Survey Research Methods (4)**

Lecture/discussion—3 hours; field work—1 hour; term paper. Theories, principles and application of survey research methodology. Students develop, validate, and administer survey instruments; select representative samples; conduct focus groups; and collect, organize, and analyze survey data. Familiarity with introductory concepts in descriptive and inferential statistics is assumed. Offered irregularly.—(F, S. (F, S.) Abedi, Welsh

#### **238. Participatory Action Research (PAR) (4)**

Lecture/discussion—3 hours; fieldwork—1 hour. introductory research methods course recommended. Principles and strategies of PAR and related methodologies that emphasize collaborating with those affected by the issue being researched in order to educate, take action or effect social change. Conduct interviews with potential collaborators, case analyses and research proposals.—W. (W.) Ballard

#### **239. Interview Methods (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 201 or equivalent course recommended. Introduction to qualitative interviewing, focused in particular on narrative and self-story as both practical method and theoretical stance. Students complete a case-focused interview project during the course: designing an interview protocol, conducting the interview, transcribing, analyzing, and presenting their research. Offered in alternate years.—Ching

#### **242. Research on Text Comprehension (4)**

Seminar—3 hours; term paper. Prerequisite: consent of instructor. Analysis of recent research related to cognitive processing of written texts. Topics include word decoding, schema theory, background knowledge, assimilation, accommodation, working memory, processing depth, vocabulary acquisition, sentence-level processes, text-level processes, text structure, implications for curriculum and instruction. Offered irregularly.—Solari,

#### **243. Research on the Teaching and Learning of Writing (4)**

Seminar—4 hours. Prerequisite: consent of instructor. Study of issues in research on composition; history of composition studies; data analysis techniques; product and process approaches; cognitive and social perspectives. Offered irregularly.

#### **244. Topical Seminar in Language, Literacy and Culture (4)**

Seminar—3 hours; project—1 hour. Critical study of selected issues of language, literacy, and culture as they relate to education. May be repeated two times for credit when topic differs.—F, W, S. (F, W, S.) Athanases, Enright, Martinez, Solari, Tonkovich

#### **245. Theory and Research in Early Literacy (4)**

Seminar—3 hours; field work—1 hour. Analysis of children's initial processes in learning to read extending from the preschool years into second grade. Topics include emergent literacy, phonological awareness, word recognition, decoding, spelling, vocabulary, comprehension, second language reading, assessment, intervention, and instruction. Offered irregularly.—Tonkovich

#### **246. Reading as a Social and Cultural Process (4)**

Lecture—3 hours; field work—1 hour. Prerequisite: course 211 recommended. Recent theoretical and empirical work on reading in social contexts. Topics include reading as an individual interactive process; reading as a social and cultural process; critical perspectives on reading; implications of contrastive theoretical perspectives for curriculum and instruction in reading. Offered irregularly.

**247. Research on Response to Culturally Diverse Literature, K-12 (4)**

Lecture—3 hours; field work—1 hour. Research on response to culturally diverse literature in classrooms and other K-12 settings. Topics include reader response theories, values in expanding the literary canon, problems of cultural authenticity, resistance to multicultural literature, and instruction for diverse texts and learners. Offered in alternate years.—Athanases

**248. Academic Language and Literacies (4)**

Seminar—3 hours; fieldwork; project. Prerequisite: graduate standing or consent of instructor. Exploration of theories and research on academic language and literacies for the schooling of first and second language learners. Students use basic qualitative methods to collect and analyze classroom language and literacy data. Offered in alternate years.—Enright

**249. Discourse Analysis in Educational Settings (4)**

Seminar—3 hours; term paper. Prerequisite: an introductory linguistics or sociolinguistics course or consent of instructor. Examines form and type in discourse (e.g., narration, conversation, routines), approaches to discourse analysis, and research on classroom discourse (lessons, teaching/learning interactional sequences). Final term paper is an analysis of discourse data tape-recorded by student in a field setting.—W. (W.) Watson-Gegeo

**251. Research in Bilingual and Second Language Education (3)**

Seminar—3 hours. Discussion and analysis of recent research in bilingual and second language education. Topics include: language acquisition in second language learners and bilinguals, second language teaching methods, language-use models in bilingual education, interaction analysis in bilingual/cross-cultural classrooms, use of the vernacular in classrooms. Offered irregularly.—Tonkovich

**253. Language and Literacy in Linguistic Minorities (3)**

Seminar—2 hours; field work—3 hours. Prerequisite: acceptance in Teacher Credential Program. Analysis and application of research on oral language development and literacy in language minority students, through the development, implementation, and evaluation of research-based language arts curriculum.—S. (S.)

**255. Curriculum Development and Evaluation in Mathematics (4)**

Seminar—4 hours. Prerequisite: consent of instructor. Analysis of curricular issues and goals in mathematics education, including long-term trends, current status and influences, proposed changes, and evaluation issues. Selected curriculum projects will be examined. Offered irregularly.—Ambrose, White

**256A. Research in Mathematics Education (4)**

Seminar—4 hours. Prerequisite: consent of instructor. Examination of research process in mathematics education; review of critical productive problems identified by researchers; evolution of trends, issues, theories and hypotheses in various areas of mathematics education research. Course emphasizes foundations. Offered irregularly.—Ambrose, White

**256B. Research in Mathematics Education (4)**

Seminar—4 hours. Prerequisite: consent of instructor. Current research issues and activities in mathematics education: status, trends, theories and hypotheses. Formulation of research questions and design of studies. Projection of future directions for research. Offered irregularly.—Ambrose, White

**257. Computer Technology in Mathematics Education (4)**

Seminar—4 hours. Prerequisite: consent of instructor. The roles of calculators, computers, and graphing calculators in mathematics education will be addressed, with emphasis on the impact of these technologies on curriculum reform. Selected efforts to integrate technology into mathematics instruction will be examined. Offered irregularly.—White

**260. The Modern History of Science Education (4)**

Seminar—4 hours. Prerequisite: consent of instructor. History of curricular issues and goals in science education from the late 19th century forward, including long-term trends, current status and influences, proposed changes, and evaluation issues. National science standards and curriculum projects. Offered irregularly.—Passmore

**262A. Research Topics in Science Education I (4)**

Seminar—4 hours. Prerequisite: consent of instructor. Research process and product in science education; review of critical science education issues; evolution of trends, theories and hypotheses in various areas of science education research. Survey of current major research in science education. Offered irregularly.

**262B. Research Topics in Science Education II (4)**

Seminar—4 hours. Current research issues and activities in science education: status, trends, theories and hypotheses. Formulation of research questions, design of studies and critical, in-depth review of literature related to the student's research interests. Offered irregularly.—Passmore

**264. Scientific Literacy and Science Education Reform (4)**

Seminar—4 hours. Prerequisite: consent of instructor. Current trends in science education reform locally, regionally, and nationally focusing on scientific literacy. Equity, access and "science for all." Offered irregularly.—Ballard, Patterson, Trexler

**270. Research on Teacher Education and Development (4)**

Seminar—3 hours; project. Experience with formal or informal teaching recommended. Research on teacher preparation in university credential programs and on professional development of in-service teachers, with special attention to teacher preparation for work with culturally and linguistically diverse youth. Offered irregularly.—Athanases

**271. Supervision of Student Teachers: Research, Theory & Practice (4)**

Lecture/discussion—3 hour; fieldwork—1 hour. Research, theory and practice in the preparation and supervision of teachers. Practice in the supervision of candidates in university teaching credential programs during the student teaching field placement and the mentoring of novice teachers by expert teachers. Offered irregularly.

**275A. Effective Instruction: Curriculum and Assessment-Theory, Research, and Practice (2)**

Lecture/discussion—2 hours. Prerequisite: acceptance in Teacher Credential Program. Restricted to Teaching Credential majors. Examination of contemporary theories of curriculum development, research about the relationship among instructional planning, classroom assessment, and student learning to guide teaching practice.—F. (F. W.) Holmes

**275B. Effective Instruction: English Language Development and Instructing English Language Learners (2)**

Lecture/discussion—2 hours. Prerequisite: acceptance in the Teaching Credential program. Analysis and application of English language acquisition and development research to teaching practice. Particular attention to research that enhances learning of English language learners and under-performing students.—F. W. (F. W.) Fortes, Holmes

**280A. Inquiry and Practice: Qualitative Research for Educational Leaders (4)**

Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Prepares students to understand the nature/assumptions/logic of qualitative methodology as applied to educational settings, focusing on issues of design/conceptualization/interpretation/application of qualitative research procedures. Students will use these methods in conducting studies in their educational settings.—F. (F.) Rodriguez

**280B. Inquiry and Practice: Quantitative Research for Educational Leaders (4)**

Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Field-based and general quantitative research methods in education will focus this course. Students acquire skills and knowledge to collect, organize, analyze, and interpret univariate and multivariate quantitative data in educational research, dissertation projects, and field-based projects.—W. (W.) Hart

**280C. Inquiry and Practice: Research Design and Application for Educational Leaders (4)**

Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Educational leaders are introduced to qualitative, quantitative, and mixed-methods educational research methods and learn to frame research questions, identify data/sources, use descriptive statistics, critically examine research studies, make sense of educational research/policy, and conduct independent studies.—S. (S.) Gee

**281A. Problem-Based Learning Courses: Part 1 (4)**

Lecture/discussion—4 hours; extensive writing or discussion; fieldwork. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Students identify problems from their educational settings, engage in data collection/analysis, write-up the process/results, and present to class. Work may become a dissertation proposal, if the problem or its extension is of sufficient interest and value.—F. (F.) Heckman

**281B. Problem-Based Learning Courses: Part 2 (4)**

Lecture/discussion—4 hours; extensive writing or discussion; fieldwork. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Continuation of part one.—W. (W.) Quijada

**281C. Problem-Based Learning Courses: Part 3 (4)**

Lecture/discussion—4 hours; extensive writing or discussion; fieldwork. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Continuation of part two.—S. (S.) Kurlaender

**282A. Beginning Issues and Practices: Contemporary Educational Leadership (4)**

Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Students explore the history and emergent relationships among leadership theories/practice and their application to current educational settings. Students will reflect on and refine their personal theory of leadership.—F. (F.) Rodriguez

**282B. Beginning Issues and Practices: Diversity Issues for Educational Leaders (4)**

Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. The diversity of stakeholders and community issues in California schools and colleges will be explored. Emphasis will be placed on the interaction between underrepresented segments of society and educational institutions. Best Practices in leading diverse schools will be explored.—W. (W.) Cuellar

**283A. Advanced Issues and Practices: Leadership Across Communities (4)**

Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Students examine the theory/practice/process of leadership in community-building and collaboration in/across communities, while addressing the utilization of human and material resources and the creation of partnerships, community linkages, and collaborative efforts.—S. (S.)

**283B. Advanced Issues and Practices: Leadership and Student Services (4)**

Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Practical and theoretical per-

spectives for building a sense of vision to lead the profession of student affairs and to meet the needs of the whole student.—S. (S.) Quijada

#### **284A. Policy: History and Theory of Educational Policy (4)**

Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Students learn/analyze the history/theory of educational policy. They see how education leaders have/can positively influence the process and implement effective policies in their local institutions. Policy issues covered: educational opportunity, equity, access, regulation, testing, tenure, accountability.—F. (F.)

#### **284B. Policy: Formulating and Influencing Policy (4)**

Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Students will conduct critical analyses of policy at the federal, judicial, state, regional and local levels. Specific California and federal policy environment structures, processes and people will be examined for intended consequences, ethical dilemmas, social justice and equity issues.—W. (W.) Martorell

#### **284C. Policy: Possibilities and Limitations of Educational Policy in a Democracy (4)**

Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Students will critically examine the democratic purposes of education in light of existing National, State, and local policy reform efforts. Questions like, In what ways are these reforms and policies guided by democratic ideas and challenged by those ideals.—W. (W.)

#### **285A. Educational Finance, Human Resources, and Law: Integrated Seminar: Human and Financial Assets: Allocations, and Budgets (4)**

Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Topics include: education finance theory, contemporary finance policy issues, intergovernmental relations, effective resource management, budget analysis and preparation.—S. (S.) Rose

#### **285B. Educational Finance, Human Resources, and Law: Ethical and Legal Issues in Education (4)**

Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Human resource and legal concepts and activities governing decisions of school leaders in public education. Attention to theory, application, and practice of personnel and risk management, curriculum, student services, teacher rights, torts, student rights.—F. (F.)

#### **285C. Educational Finance, Human Resources, and Law: Human Resources and Personnel (4)**

Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Human resource management research and theory and for applying human resource techniques in the educational setting.—S. (S.)

#### **286A. Organizational Structures and Change: Data-Driven Decision-Making for Change (4)**

Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Students use and examine multiple sources of information and data and trends found in making quality decisions to improve P-12/ community college settings and addressing problems at sites. Students learn limitations of these data sources.—F. (F.) Heckman

#### **286B. Organizational Structures and Change: Curriculum & Instruction Issues in Education (4)**

Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. This course addresses the

historical development of various curriculum and instructional methodologies found in public and private schools and colleges, and their impact on current curriculum development and reform efforts at the national, state and local level.—W. (W.)

#### **287. CANDEL Dissertation Seminars (6-12)**

Prerequisite: admission into the CANDEL EdD program or consent of instructor. Third year seminars encourage students to complete dissertations within the year. Cohort members meet together in every three-week meetings with faculty members and share their writing, data collection, analysis, discussion of results, development of conclusions/implications. May be repeated nine times for credit until completion of dissertation. (S/U grading only.)—F, W, S. (F, W, S.)

#### **287D. CANDEL Dissertation (6-12)**

Prerequisite: passing of qualifying exams in CANDEL program and advancement to candidacy; consent of instructor. Cohort members continue to meet with faculty and share their writing, data collection, analysis, development of conclusions/implications. May be repeated nine times for credit until completion of dissertation. (S/U grading only.)—F, W, S. (F, W, S.)

#### **291. Proseminar in Education (4)**

Seminar—3 hours; fieldwork—3 hours. Prerequisite: admission to the M.A. or Ph.D. graduate program in Education. Professional induction into educational research field and Graduate Group in Education at UC Davis. Introduction to landscape of educational research methodologies, purposes and theories. Analysis of debates within field. Investigation of K-12 educational outreach efforts at UC Davis. May be repeated two times for credit. May take the course one time as an MA student and one time as a PhD student.—F. (F.) Ambrose, Martinez, Solari, Welsh

#### **292. Special Topics in Education (2-4)**

Variable—2-4 hours. Prerequisite: consent of instructor. Selected topics in education. Designed to facilitate preparation for the qualifying examination or dissertation. Students will critically analyze scholarly work including their own works in progress. May be repeated for credit.—F, W, S. (F, W, S.)

#### **294. Special Topics in Science, Agriculture and Mathematics Education (4)**

Seminar—3 hours; term paper; project. Critical study of special topics of research relevant to science, agricultural and mathematics education. Students and faculty present work-in-progress on a major research project, and critically analyze and discuss one another's developing scholarly work. May be repeated for credit when topic differs.—W, S. (W, S.) Ambrose, Ballard, Martin, Patterson, White

#### **295. Special Topics in Learning and Mind Science (4)**

Seminar—3 hours; term paper. Critical study of selected issues in the learning sciences, neurodevelopmental disorders, and psychometrics and measurement, as they relate to education. May be repeated for credit when topic differs. Offered irregularly.—Abedi, Ching, Martin, Mundy, Solari, White

#### **298. Group Study (1-5)**

Prerequisite: consent of instructor. (S/U grading only.)—F, W, S. (F, W, S.)

#### **299. Individual Study (1-6)**

Independent study—3-18 hours. Prerequisite: consent of instructor. Individual study under the direction of a faculty member. (S/U grading only.)—F, W, S. (F, W, S.)

#### **299D. Research (1-12)**

Independent study—3-36 hours. Prerequisite: consent of instructor. Research for individual graduate students. (S/U grading only.)—F, W, S. (F, W, S.)

#### **Professional**

#### **300. Reading in the Elementary School (4)**

Lecture—3 hours; fieldwork—3 hours. Prerequisite: acceptance in Teacher Credential Program. Principles, procedures, and curriculum materials for teach-

ing of reading. Includes decoding skills with a special emphasis on phonics, comprehension skills, study skills, and reading in the content areas.—F. (F.)

#### **301. Reading in the Secondary School (4)**

Discussion—4 hours. Prerequisite: graduate standing, enrollment in the secondary credential program, or consent of instructor. Principles, procedures, and materials to help secondary school teachers improve the reading competence of students. Strategies for enhancing learning through reading and writing in all disciplines, with special attention to linguistically diverse populations.—F. W. (F, W.) Faltis, Martinez

#### **301A. Teaching Literacy in High School Contexts (2)**

Lecture/discussion—2 hours. Prerequisite: acceptance in Teacher Credential Program; consent of instructor. Restricted to students enrolled in the secondary credential program. Focuses on secondary school literacy practices and strategies for engaging English-speaking and bilingual students with textual, image, and digital literacies across content areas. Covers reading and writing, the Common Core and Language Proficiency standards.—F, W. (F, W.) Faltis, Martinez

#### **301B. Teaching Literacy in High School Contexts (2)**

Lecture/discussion—2 hours. Prerequisite: acceptance in Teacher Credential Program. Restricted to students enrolled in the secondary credential program. Focuses on secondary school literacy practices and strategies for engaging English-speaking and bilingual students with textual, image, and digital literacies across content areas. Covers reading and writing, the Common Core and Language Proficiency standards.—F, W. (F, W.) Faltis, Martinez

#### **302. Language Arts in the Elementary School (2)**

Lecture—2 hours. Prerequisite: acceptance in Teacher Credential Program. Principles, procedures, and materials for the teaching of oral and written expression, listening skills, drama, and children's literature in elementary schools. Offered irregularly.

#### **303. Art Education in the Elementary School (2)**

Lecture/discussion—2 hours. Prerequisite: acceptance in Teacher Credential Program. Understanding the principles of education in the arts through participation. Development of concepts, introduction to media, and techniques suitable for the elementary school. Curriculum, pedagogy, and materials for teaching the visual and performing arts curriculum in elementary schools.—S. (S.)

#### **304A. Teaching in the Elementary Schools (2-18)**

Lecture/discussion—2 hours; fieldwork—9-48 hours. Prerequisite: acceptance in Teacher Credential Program. Supervised teaching in regular classrooms in elementary schools. Selection and organization of teaching materials. Introduction to techniques of diagnosing school achievement of children.—F. (F.)

#### **304B. Teaching in the Elementary Schools (2-18)**

Lecture/discussion—2 hours; fieldwork—9-48 hours. Prerequisite: acceptance in Teacher Credential Program. Supervised teaching in regular classrooms in elementary schools. Current conceptions of elementary school curriculum, emphasis on contributions from the social, biological, and physical sciences. Emphasis on effective teaching methods.—W. (W.)

#### **304C. Teaching in the Elementary Schools (2-18)**

Lecture/discussion—2 hours; fieldwork—9-48 hours. Prerequisite: acceptance in Teacher Credential Program. Supervised teaching in regular classrooms in elementary schools. Evaluation of teaching materials including instructional technology. Current elementary school curriculum with emphasis on contributions from fine arts and humanities.—S. (S.)

#### **305A. Teaching in the Middle Grades (5-8)**

Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: acceptance in Teacher Credential Program. Supervised teaching in

regular or special education classrooms in middle grades. Current conceptions of the middle-grades curriculum with emphasis on social, biological, and physical sciences. Effective teaching methods. Offered irregularly.

### **306A. Teaching in the Secondary Schools (2-18)**

Lecture/discussion—2 hours; fieldwork—9-48 hours. Prerequisite: acceptance in Teacher Credential Program. Supervised teaching in regular secondary classrooms. Techniques for classroom communications; constructing goals and objectives; assessment of learning; special problems of adolescents; instructional technology.—F. (F.)

### **306B. Teaching in the Secondary Schools (2-18)**

Lecture/discussion—2 hours; fieldwork—9-48 hours. Prerequisite: acceptance in Teacher Credential Program. Supervised teaching in regular secondary classrooms. Techniques for classroom communications; constructing goals and objectives; assessment of learning; special problems of adolescents; instructional technology.—W. (W.)

### **306C. Teaching in the Secondary Schools (2-18)**

Lecture/discussion—2 hours; fieldwork—9-48 hours. Prerequisite: acceptance in Teacher Credential Program. Supervised teaching in regular secondary classrooms. Techniques for classroom communications; constructing goals and objectives; assessment of learning; special problems of adolescents; instructional technology.—S. (S.)

### **307. Methods in Elementary Science (2)**

Lecture/discussion—2 hours. Prerequisite: acceptance in Teacher Credential Program. Principles, procedures, and materials for teaching the biological and physical sciences in elementary schools.—F. (F.) Patterson, Passmore, Trexler

### **308. Methods in Elementary Social Studies (2)**

Lecture/discussion—2 hours. Prerequisite: acceptance in Teacher Credential Program. Principles, procedures, and materials for teaching history and the social sciences in elementary schools.—W. (W.) Rosa

### **309. The Teaching of Mathematics, K-9 (3)**

Lecture/discussion—3 hours. Prerequisite: acceptance in Teacher Credential Program. Mathematics curriculum and teaching methods for K-9 reflecting the needs of California's diverse student populations.—W. (W.) Mendle

### **322A. Pedagogical Preparation for Secondary Social Science I (3)**

Lecture/discussion—2 hours; discussion—1 hour. Prerequisite: acceptance in Teacher Credential Program. Introduction to teaching methods and curriculum approaches for secondary social science teaching. State and national curriculum standards; application of learning theory to effective instruction; interdisciplinary teaching and active learning approaches; effective teaching strategies for English Learners.—F. (F.) Rosa

### **322B. Pedagogical Preparation for Secondary Social Science II (3)**

Lecture/discussion—1 hour; discussion—2 hours. Prerequisite: acceptance in Teacher Credential Program. Intermediate teaching methods and curriculum approaches for secondary social science teaching. Interdisciplinary approaches to teaching major themes across social science content areas; teaching potentially controversial social science topics; teaching democratic civic values; student assessment and evaluation.—W. (W.) Rosa

### **323A. Physical Science in the Secondary School (3)**

Laboratory/discussion—2 hours; discussion/laboratory—1 hour. Prerequisite: acceptance in Teacher Credential Program. Activity-based overview of concepts and processes in secondary school physical sciences. Emphasis upon philosophy, appropriate teaching methods, materials, assessment and evaluation of learning.—F. (F.) Passmore, Pomeroy

### **323B. Life Sciences in the Secondary School (3)**

Laboratory/discussion—2 hours; discussion/laboratory—1 hour. Prerequisite: acceptance in Teacher Credential Program. Activity-based overview of concepts and processes in secondary school biology and life sciences. Emphasis on philosophy, appropriate teaching methods, materials, assessment and evaluation of learning, and issues.—W. (W.) Passmore, Pomeroy

### **324A. Methods and Technology in Secondary Mathematics I (4)**

Lecture/discussion—4 hours. Prerequisite: acceptance in Teacher Credential Program; consent of instructor. Introduction to methods and curriculum for teaching mathematics at the secondary level. Introduction to applications of computer technology as instructional, intellectual, and communication tools for mathematics teachers.—F. (F.) Wallace

### **324B. Methods in Secondary Mathematics II (3)**

Lecture/discussion—3 hours. Prerequisite: acceptance in Teacher Credential Program; consent of instructor. Expansion of methods and curriculum for teaching mathematics at the secondary level. Intermediate applications of computer technology as instructional, intellectual, and communication tools in mathematics teaching.—W. (W.) Wallace

### **325. Research and Methods in Secondary English Language Arts (4)**

Discussion—4 hours. Prerequisite: acceptance in Teacher Credential Program; consent of instructor. Research on teaching and learning in the language arts. Principles, procedures and materials for improving the writing, reading and oral language of secondary students, with special attention to students from culturally and linguistically diverse populations.—F. (F.) Holmes

### **326. Teaching Language Minority Students in Secondary Schools: Methods and Research (4)**

Seminar—3 hours; field work—3 hours. Prerequisite: acceptance in Teacher Credential Program; consent of instructor. Research on principles, procedures and curricula for teaching discipline-specific concepts to language-minority students in secondary schools. Second-language acquisition principles and instructional strategies. Offered irregularly.

### **327A. Teaching Methods for Secondary Foreign Language/Spanish, Part I (3)**

Lecture—3 hours. Prerequisite: acceptance in Teacher Credential Program. Introduction to methods for teaching Spanish as a foreign and a heritage language in secondary schools. State and National Standards. Theories on second language acquisition. Lesson plans. Effective teaching strategies and class management. Open to Graduate Teaching Credential students. Offered irregularly.

### **327B. Teaching Methods for Secondary Foreign Language/Spanish, Part II (3)**

Lecture—3 hours. Prerequisite: acceptance in Teacher Credential Program. Continuation to methods for teaching Spanish as a foreign and a heritage language in secondary schools. Research and practice on foreign and heritage language teaching. Expansion of effective teaching strategies and class management. Open to Graduate Teaching Credential students. Offered irregularly.

### **398. Group Study (1-5)**

(S/U grading only.)

### **399. Individual Study (1-5)**

(S/U grading only.)

## **Education (A Graduate Group)**

Michal Kurlaender, Chairperson of the Group

**Group Office.** 106 School of Education Building 530-752-7259; Fax 530-754-6672;  
[phdeduadvising@ucdavis.edu](mailto:phdeduadvising@ucdavis.edu)

### **Faculty**

Leonard Abbeduto, Ph.D., Professor; Director of UC Davis MIND Institute and Tsakopoulos-Vismara Endowed Chair (*Psychiatry and Behavioral Sciences*)

Jamal Abedi, Ph.D., Professor (*Education*)

Rebecca C. Ambrose, Ph.D., Associate Professor (*Education*)

Shannon Anderson, Ph.D., Professor (*Graduate School of Management*)

Steven Z. Athanases, Ph.D., Professor (*Education*)

Heidi Ballard, Ph.D., Associate Professor (*Education*)

Robert Bayley, Ph.D., Professor (*Linguistics*)

Robert Blake, Ph.D., Professor

(*Spanish & Portuguese*)

Scott E. Carrell, Ph.D., Associate Professor

(*Economics*)

Cynthia Carter Ching, Ph.D., Associate Professor (*Education*)

Harry Cheng, Ph.D., Professor; Director of UC Davis K-14 Outreach Center for Computing and STEM Education (C-STEM) (*Mechanical and Aerospace Engineering*)

Cecilia Colombi, Ph.D., Professor (*Spanish*)

Marcela Cuellar, Ph.D., Assistant Professor (*Education*)

Adela de la Torre, Ph.D., Professor

(*Chicano/a Studies*)

Kerry Enright, Ph.D., Associate Professor (*Education*)

Nancy Erbstein, Ph.D., Assistant Research Scientist (*Human and Community Development*)

Christian Faltis, Ph.D., Professor; Director of Teacher Education (*Education*)

Dana Ferris, Ph.D., Professor; Associate Director for Lower-Division Writing (*University Writing Project*)

Kevin Gee, Ed.D., Assistant Professor (*Education*)

Cristina Gonzalez, Professor

(*Spanish and Education*)

Randi Hagerman, M.D., Professor; Medical Director (*M.I.N.D. Institute*)

Cassandra Hart, Ph.D., Assistant Professor

(*Education*)

Paul Heckman, Ph.D., Professor and Associate Dean (*Education*)

Jacob Hibel, Ph.D., Assistant Professor (*Sociology*)

Michal Kurlaender, Ed.D., Associate Professor

(*Education*)

Harold Levine, Ph.D., Professor and Dean

(*Education*)

Lee Martin, Ph.D., Assistant Professor (*Education*)

Danny Martinez, Ph.D., Assistant Professor

(*Education*)

Paco Martorell, Ph.D., Assistant Professor

(*Education*)

Julia Menard-Warwick, Ph.D., Associate Professor

(*Linguistics*)

Barbara J. Merino, Ph.D., Professor Emeritus

(*Education*)

Lisa M. Soederberg Miller, Ph.D., Associate Professor; Director, Adult Development Lab

(*Human and Community Development*)

Marco Molinaro, Ph.D., Chief Education Officer, Center for Biophotonics Science and Technology

Peter C. Mundy, Ph.D., Professor (*Education*)

Debbie Niemeier, Ph.D., Professor

(*Civil & Environmental Engineering*)

Adrienne Nishina, Ph.D., Assistant Professor

(*Human and Community Development*)

Patsy Eubanks Owens, Professor, Chair of Landscape Architecture (*Environmental Design*)

Marianne Page, Ph.D., Associate Professor

(*Economics*)

Cynthia Passmore, Ph.D., Associate Professor

(*Education*)

Sarah Perrault, Ph.D., Assistant Professor

(*University Writing Program*)

J. Richard Pomeroy, Ph.D., Lecturer, Supervisor of Teacher Education (*Education*)  
 Wendell Potter, Ph.D., Senior Lecturer Emeritus (*Physics*)  
 Patricia Quijada, Ph.D., Associate Professor (*Education*)  
 Gloria Rodriguez, Ph.D., Assistant Professor (*Education*)  
 Heather M. Rose, Ph.D., Associate Professor (*Education*)  
 Julie Schweitzer, Ph.D., Associate Professor (*Psychiatry & Behavioral Sciences*); Director (*ADHD Program, M.I.N.D. Institute*)  
 Kimberlee Shawman, Ph.D., Associate Professor (*Sociology*)  
 Emily Solaro, Ph.D., Assistant Professor (*Education*)  
 Dean Tantillo, Ph.D., Professor (*Chemistry*)  
 Christopher Thaiss, Ph.D. (*Clark Kerr Presidential Chair and Director, University Writing Program*)  
 Ross Thompson, Ph.D., Professor (*Psychology*)  
 Thomas Timar, Ph.D., Professor Emeritus (*Education*)  
 Cary Trexler, Ph.D., Associate Professor (*Education*)  
 Yuuko Uchikoshi Tonkovich, Ed.D., Associate Professor (*Education*)  
 Karen Watson-Gegeo, Ph.D., Professor (*Education*)  
 Megan Welsh, Ph.D., Assistant Professor (*Education*)  
 Tobin White, Ph.D., Associate Professor (*Education*)  
 Carl Whithaus, Ph.D., Professor, Director (*University Writing Program*)

**Graduate Study.** The Graduate Group in Education offers programs of study and research leading to the Ph.D. degree. Students may concentrate in; language, literacy and culture; learning and mind sciences; mathematics education; school organization and educational policy; or science and agriculture education. Students may also combine these fields of study with designated emphasis areas such as Critical Theory; Second Language Acquisition, Women's Studies, and Writing, Rhetoric, and Composition Studies. Detailed information regarding graduate study may be obtained by writing the Graduate Coordinator or at <http://education.ucdavis.edu/programs/PhDOverview.html>.

**Preparation.** Students should have earned a Bachelor's or M.A. degree or the equivalent in a discipline relevant to their proposed emphasis program. For example, students applying for the mathematics education emphasis should have earned the B.A. or M.A. or M.A.T. degree in mathematics or mathematics education.

**Graduate Advisers.** Lee Martin, Heather Rose, and Danny Martinez

**Graduate Coordinator.** Mary M. Reid

**Courses.** See *Education, School of*, on page 257.

## Endocrinology and Metabolism

See **Internal Medicine (IMD)**, on page 437.

## Engineering

(College of Engineering)

Jennifer Sinclair Curtis, Ph.D., Dean

S. Felix Wu, Ph.D., Associate Dean—Academic Personnel and Planning

Jean S. VanderGheynst, Ph.D., Associate Dean—Research and Graduate Studies

James A. Schaaf Ph.D., Associate Dean—Undergraduate Studies

C.P. (Case) van Dam, D. Engr., Associate Dean—Facilities and Capital Planning

Bruce White, Ph.D., Executive Associate Dean

**College Office.** 1042 Kemper Hall  
 530-752-7642;  
<http://engineering.ucdavis.edu>  
<http://www.facebook.com/UCDEngineering>

### Undergraduate Study

The college has eight departments:

- Biological and Agricultural Engineering
- Biomedical Engineering
- Chemical Engineering
- Civil and Environmental Engineering
- Computer Science Engineering
- Electrical and Computer Engineering
- Materials Science and Engineering
- Mechanical and Aerospace Engineering

### Graduate Study

Graduate degrees (M.S and Ph.D.) are offered in the following engineering disciplines:

- Biological Systems Engineering
- Biomedical Engineering
- Chemical Engineering
- Civil and Environmental Engineering
- Computer Science
- Electrical and Computer Engineering
- Materials Science and Engineering
- Mechanical and Aerospace Engineering
- Transportation Technology and Policy

### The Major Programs

Eleven majors, leading to the B.S. degree, are open to students.

- Aerospace Science & Engineering
- Biochemical Engineering
- Biological Systems Engineering
- Biomedical Engineering
- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Computer Science and Engineering
- Electrical Engineering
- Materials Science and Engineering
- Mechanical Engineering

### Minor Programs

The College of Engineering offers nine undergraduate minors:

- Biomedical Engineering (Department of Biomedical Engineering)
- Computational Biology (Department of Computer Science)
- Construction Engineering and Management (Department of Civil and Environmental Engineering)
- Electrical Engineering (Department of Electrical and Computer Engineering)
- Energy Science and Technology (Department of Biological and Agricultural Engineering)
- Energy Policy (Department of Biological and Agricultural Engineering)
- Energy Efficiency (Department of Biological and Agricultural Engineering)
- Materials Science (Department of Materials Science and Engineering)
- Sustainability in the Built Environment (Department of Civil and Environmental Engineering)

### Courses in Engineering (ENG)

Students are encouraged to carefully adhere to all prerequisite requirements. The instructor is authorized

to drop students from a course for which stated prerequisites have not been completed.

### Lower Division

#### 1. Introduction to Engineering (1)

Lecture—1 hour. Open to first year students only. Introduction to the role of engineers in the acquisition and development of engineering knowledge, the differences and similarities among engineering fields, and the work ethic and skills required for engineering. (P/NP grading only.) GE credit: SE.—F. (F.) Schaaf

#### 2. Creativity and Entrepreneurship for Engineers (3)

Discussion—3 hours. Introduction to entrepreneurial thinking from an engineer's perspective. Focus on identifying entrepreneurial opportunities, developing prototypes, and generating business models. Emphasis on developing a creative and entrepreneurial mindset. GE credit: SciEng or SocSci | SE or SS.

#### 4. Engineering Graphics in Design (3)

Lecture—2 hours; laboratory—3 hours. Engineering design, descriptive geometry, pictorial sketching, computer-aided graphics, and their application in the solution of engineering problems. GE credit: SciEng | SE, VL.—F, W. (F, W.) Schaaf, Soshi

#### 6. Engineering Problem Solving (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A, 17A or 21A, C- or above; Mathematics 16B, 17B or 21B, C- or above (may be taken concurrently). Methodology for solving engineering problems. Engineering computing and visualization based on MATLAB. Engineering examples and applications. GE credit: SciEng | QL, SE.—F, W, S. (F, W, S.)

#### 7. Technology and Culture of the Internet (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: basic computer experience recommended. Technology and culture of networked computing and the Internet. Topics include the history and development of networked computing; Internet architecture and services; basics of Web page design and hypertext markup language; political, social, cultural, economic and ethical issues related to the Internet. Offered irregularly. GE credit: SciEng | SE.

#### 10. The Science Behind the Technology in Our Lives (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: high school algebra. Understanding of how the technology in our lives works using only basic concepts and rudimentary mathematics. GE credit: SciEng or SocSci, Wrt | SE or SS.—F, W. (F, W.) Orel, Parikh

#### 11. Issues in Engineering (1)

Lecture—1 hour. Prerequisite: Participation in the MESA Engineering Program or consent of instructor. Designed to broaden student's understanding of the engineering profession, its methods, principles, design and development process, career opportunities, and professional resources. Offered irregularly.

#### 17. Circuits I (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22A (C- or better recommended); Mathematics 22B (C- or better recommended) may be taken concurrently; Physics 9C or 9HD (C- or better recommended). Basic electric circuit analysis techniques, including electrical quantities and elements, resistive circuits, transient and steady-state responses of RLC circuits, sinusoidal excitation and phasors, and complex frequency and network functions. GE credit: SciEng | SE, VL.—F, S. (F, S.)

#### 20. Introduction to Space Exploration: Understanding the Technological and Environmental Challenges to Our Exploration of the Solar System (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: high school level Algebra, Geometry, General Science (Physics and Chemistry). Introductory overview of the space environment. Discussion of space exploration technology including propulsion, orbital mechanics, and spacecraft engineering. Offered irregularly. GE credit: SciEng | QL, SE, SL.

**35. Statics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Physics 9A C- or better and Mathematics 21D C- or better concurrently. Force systems and equilibrium conditions with emphasis on engineering problems. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**45. Properties of Materials (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: C- or better in Mathematics 16C or 21C, Chemistry 2A, and Physics 9A. Introductory course on the properties of engineering materials and their relation to the internal structure of materials. GE credit: SciEng, Wrt | QL, SE, SL, WE.—F, W, S, Su. (F, W, S, Su.)

**45H. Honors Properties of Materials (1)**

Discussion—1 hour. Prerequisite: enrollment in the Materials Science and Engineering Honors Program; concurrent enrollment in course 45 required. Examination of special materials science and engineering topics through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Open only to students in the Materials Science and Engineering Honors program.—W. (W.)

**45Y. Properties of Materials (4)**

Web virtual lecture; laboratory. Prerequisite: C- or better in Mathematics 16C or 21C; Chemistry 2A and Physics 9A. Introductory course on the properties of engineering materials and their relation to the internal structure of materials. Not open for credit to students who have taken course 45. GE credit: SciEng | QL, SE, SL.—Su. (Su.)

**98. Directed Group Study (1-4)**

Restricted to College of Engineering students only. (P/NP grading only.) May be repeated for credit up to three times when content differs.

**Upper Division****100. Electronic Circuits and Systems (3)**

Laboratory—3 hours; lecture—2 hours. Prerequisite: course 17 (C- or better is recommended). Introduction to analog and digital circuit and system design through hands on laboratory design projects. Students who have completed Electrical and Computer Engineering 100 may receive only 1.5 units of credit. GE credit: SciEng | SE, VL.—F, W, S. (F, W, S.)

**102. Dynamics (4)**

Lecture—4 hours. Prerequisite: grade of C- or better in Engineering 35; grade of C- or better in Mathematics 22B. Open to College of Engineering students only. Kinematics and kinetics of particles, systems of particles, and of rigid bodies; application of these topics are applied to engineering problems. Only two units of credit allowed to students who have previously taken course 36. GE credit: SciEng | QL, SE, VL.—F, W, S. (F, W, S.) Cheng, Eke, Hess, Joshi

**103. Fluid Mechanics (4)**

Lecture—4 hours. Prerequisite: C- or better in each of the following: Engineering 35 and Mathematics 22B and Physics 9B. Open to students in the College of Engineering and Hydrology majors. Fluid properties, fluid statics, continuity and linear momentum equations for control volumes, flow of incompressible fluids in pipes, dimensional analysis and boundary-layer flows. GE credit: SciEng | SE.—F, W, S. (F, W, S.) Aldredge, Davis, Delplanque, Hwang, Kennedy, Robinson

**104. Mechanics of Materials (4)**

Lecture—4 hours. Prerequisite: grade of C- or better in Engineering 35 and Mathematics 22B. Uniaxial loading and deformation. Uniaxial loading and deformation. General concepts of stress-strain-temperature relations and yield criteria. Torsion of shafts. Bending of beams. Deflections due to bending. Introduction to stability and buckling. GE credit: SciEng | QL, SE.—F, W, S. (F, W, S.)

**104L. Mechanics of Materials Laboratory (1)**

Laboratory—3 hours. Prerequisite: course 104. Experiments which illustrate the basic principles and verify the analysis procedures used in the mechanics of materials are performed using the basic tools and techniques of experimental stress analysis. GE credit: SciEng | SE.—W, S. (W, S.)

**105. Thermodynamics (4)**

Lecture—4 hours. Prerequisite: grade of C- or better in Mathematics 22B and Physics 9B. Open to College of Engineering students only. Fundamentals of thermodynamics: heat energy and work, properties of pure substances, First and Second Law for closed and open systems, reversibility, entropy, thermodynamic temperature scales. Applications of thermodynamics to engineering systems. GE credit: SciEng | QL, SE, VL.—F, W, S. (F, W, S.) Aldredge, D'Souza, Erickson

**106. Engineering Economics (3)**

Lecture—3 hours. Prerequisite: upper division standing in Engineering. The analysis of problems in engineering economy; the selection of alternatives; replacement decisions. Compounding, tax, origins and cost of capital, economic life, and risk and uncertainty are applied to methods of selecting most economic alternatives. GE credit: SciEng or SocSci | QL, SE, SL, SS, VL.—W. (W.) Hartsough, Slaughter

**111. Electric Power Equipment (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: grade of C- or better in course 17. Principles of AC and DC electric motors and generators, their control systems and power sources. Selection of electric power equipment components based on their construction features and performance characteristics. Offered irregularly. GE credit: SciEng | QL, SE, VL, WE.—Delwiche, Hartsough

**121. Fluid Power Actuators and Systems (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: grade of C- or better in Engineering 100 and Engineering 102. Hydraulic and pneumatic systems with emphasis on analysis and control of actuators. Design of hydraulic and pneumatic systems, specification and sizing of components, and selection of electro-hydraulics/electro-pneumatics, servo valves, and closed loop systems to solve basic control problems. Offered in alternate years. GE credit: SciEng | QL, SE, SL, VL, WE.—(S.) Rosa

**122. Introduction to Mechanical Vibrations (4)**

Lecture—4 hours. Prerequisite: C- or better in Engineering 102; C- or better in Engineering 6 or course 5 or Computer Science Engineering 30; ability to program in MATLAB. Free and forced vibrations in lumped-parameter systems with and without damping; vibrations in coupled systems; electromechanical analogs; use of energy conservation principles. GE credit: SciEng | QL, SE.—F. (F.) F.

**160. Environmental Physics and Society (3)**

Lecture—3 hours. Prerequisite: Physics 9D, 5C, or 10 or 1B and Mathematics 16B or the equivalent. Impact of humankind on the environment will be discussed from the point of view of the physical sciences. Calculations based on physical principles will be made, and the resulting policy implications will be considered. In the College of Engineering, students may receive only one unit of credit towards the Technical Electives requirement. (Same course as Physics 160.) GE credit: SciEng or SocSci | SE, SL.—S. (S.) Craig, Jungerman

**180. Engineering Analysis (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: C- or better in Mathematics 21D and 22B; C- or better in Engineering 6 or Mechanical Engineering 5 or Computer Science Engineering 30. Solutions of systems of linear and nonlinear algebraic equations; approximation methods; solutions of ordinary differential equations; initial and boundary value problems; solutions of partial differential equations of Elliptic, parabolic, and hyperbolic types; Eigen value problems. GE credit: SciEng | SE.—F. (F.) Hafez

**188. Science and Technology of Sustainable Power Generation (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: upper-division standing, Physics 7C or 9C. Focus on scientific understanding and development of power generation that is the basis of modern society. Concentration on power generation methods that are sustainable, in particular, discussion of the most recent innovations. GE credit: SocSci | SS.—S. (S.) Hwang

**190. Professional Responsibilities of Engineers (3)**

Lecture—3 hours. Restricted to upper-division students in the College of Engineering. Organization of the engineering profession; introduction to contracts, specifications, business law, patents, and liability; discussion of professional, ethical, societal, and political issues related to engineering. GE credit: SocSci | SS.—W, S. (W, S.) Tseregounis

**198. Directed Group Study (1-5)**

May be repeated for credit up to 3 times. (P/NP grading only.) GE credit: SE.

**Graduate****250. Technology Management (3)**

Lecture—3 hours. Prerequisite: consent of instructor. Management of the engineering and technology activity. Functions of design, planning, production, marketing, sales, and maintenance. Technological product life cycle. Research and development activity. Project planning and organization. Manufacturing issues. Case studies.—F. (S.)

## **Engineering: Applied Science**

(College of Engineering)

**The Graduate Program in Applied Science**

The Department of Applied Science is not accepting new graduate students.

**Courses in Engineering: Applied Science—Davis (EAD)****Graduate****213A. Computer Graphics (3)**

Lecture—3 hours. Prerequisite: consent of instructor. Development of algorithms for perspective line drawings of three-dimensional objects, as defined by polygons or bicubic patches.—(W.) Max

**225. Biophotonics in Medicine and the Life Sciences (3)**

Lecture/discussion—3 hours. Prerequisite: Physics 108 and Biology 101-105; course 202 highly recommended; graduate standing. Introduction to the science and technology of biomedical optics and photonics, with an overview of applications in medicine and the life sciences. Emphasis on research supported by the NSF Center for Biophotonics at UC Davis Medical Center. (Same course as Biomedical Engineering 255 and Biophysics 255.)—W. (W.) Chuang, Matthews

**230. Topics in Computational Fluid Dynamics (3)**

Lecture—3 hours. Prerequisite: course 210A, 210B or consent of instructor. A hands-on approach to numerical methods for compressible fluid flow. Readings and discussions of solution strategies complemented with programming exercises and projects to give first hand experience with performance and accuracy of several computational methods; from upwind differencing to Godunov methods.—S. (S.) Miller

**285D. Physics and Technology of Microwave Vacuum Electron Beam Devices IV (4)**

Lecture—4 hours. Prerequisite: 285C. Computational models of vacuum electron beam devices. Offered in alternate years.—(S.) Luhmann

**289A. Special Topics in Applied Science: Atomic, Molecular, and Optical Physics (1-5)**

Lecture, laboratory, or combination. Prerequisite: graduate standing or permission of instructor. Special topic in Atomic, Molecular, and Optical Physics. May be repeated for credit up to five units per segment when topic differs.—F, W, S. (F, W, S.)

**289B. Special Topics in Applied Science: Chemical Physics (1-5)**

Prerequisite: graduate standing or permission of instructor. Special topic in Chemical Physics. May be repeated for credit up to a total of five units per segment when topic differs.—F, W, S. (F, W, S.)

**289C. Special Topics in Applied Science Computational Physics (1-5)**

Prerequisite: graduate standing or permission of instructor. Special topic in Computational Physics. May be repeated for credit up to a total of five units per segment when topic differs.—F, W, S. (F, W, S.)

**289D. Special Topics in Applied Science: Biophotonics/Biotechnology (1-5)**

Prerequisite: graduate standing or permission of instructor. Special topics in Biophotonics/Biotechnology. May be repeated for credit up to a total of five units per segment when topic differs.—F, W, S. (F, W, S.)

**289E. Special Topics in Applied Science: Materials Science (1-5)**

Prerequisite: graduate standing or permission of instructor. Special topic in Materials Science. May be repeated for credit up to a total of five units per segment when topic differs.—F, W, S. (F, W, S.)

**289F. Special Topics in Applied Science: Imaging Science and Photonics (1-5)**

Prerequisite: graduate standing or permission of instructor. Special topic in Imaging Science and Photonics. May be repeated for credit up to a total of five units per segment when topic differs.—F, W, S. (F, W, S.)

**289G. Special Topics in Applied Science: Nonlinear Optics (1-5)**

Prerequisite: graduate standing or permission of instructor. Special topic in Nonlinear Optics. May be repeated for credit up to a total of five units per segment when topic differs.—F, W, S. (F, W, S.)

**289H. Special Topics in Applied Science: Plasma/Fusion Energy Physics (1-5)**

Prerequisite: graduate standing or permission of instructor. Special topic in Plasma/Fusion Energy Physics. May be repeated for credit up to a total of five units per segment when topic differs.—F, W, S. (F, W, S.)

**289I. Special Topics in Applied Science: Quantum Electronics (1-5)**

Prerequisite: graduate standing or permission of instructor. Special topic in Quantum Electronics. May be repeated for credit up to a total of five units per segment when topic differs.—F, W, S. (F, W, S.)

**289J. Special Topics in Applied Science: Condensed Matter/Statistical Physics (1-5)**

Prerequisite: graduate standing or permission of instructor. Special topic in Condensed Matter/Statistical Physics. May be repeated for credit up to a total of five units per segment when topic differs.—F, W, S. (F, W, S.)

**289K. Special Topics in Applied Science: Classical Optics (1-5)**

Prerequisite: graduate standing or permission of instructor. Special topic in Classical Optics. May be repeated for credit up to a total of five units per segment when topic differs.—F, W, S. (F, W, S.)

**289L. Special Topics in Applied Science: Microwave and Millimeter-Wave Technology (1-5)**

Prerequisite: graduate standing or permission of instructor. Special topic in Microwave and Millimeter-Wave Technology. May be repeated for credit up to a total of five units per segment when topic differs.—F, W, S. (F, W, S.)

**289M. Special Topics in Applied Science: Synchrotron Radiation Science (1-5)**

Prerequisite: graduate standing or permission of instructor. Special topic in Synchrotron Radiation Science. May be repeated for credit up to a total of five units per segment when topic differs.—F, W, S. (F, W, S.)

**289N. Special Topics in Applied Science: Space Physics (1-5)**

Prerequisite: graduate standing or permission of instructor. Special topic in Space Physics. May be repeated for credit up to a total of five units per segment when topic differs.—F, W, S. (F, W, S.)

**290. Seminar (1-2)**

Seminar—1-2 hours. (S/U grading only.)

**290C. Graduate Research Group Conference (1)**

Discussion—1 hour. Prerequisite: consent of instructor. May be repeated for credit. (S/U grading only.)

**298. Group Study (1-5)**

(S/U grading only.)

**299. Research (1-12)**

(S/U grading only.)

**Courses in Biophotonics (BPT) Graduate**

**290. Biophotonics Seminar (1)**

Seminar—1 hour. Prerequisite: graduate standing or consent of instructor. Restricted to graduate standing. Presentation of current research in the area of biophotonics by experts in the field, followed by group discussions. May be repeated up to three times for credit. (S/U grading only.)—F, W, S. (F, W, S.) Yeh

## Engineering: Biological and Agricultural

(College of Engineering and College of Agricultural and Environmental Sciences)

Bryan M. Jenkins, Ph.D., Chairperson of the Department

**Department Office.** 2030 Bainer Hall  
530-752-0102;  
<http://bae.engineering.ucdavis.edu>

**Faculty**

Gail M. Bornhorst, Ph.D., Assistant Professor  
Juliana de Moura Bell, Ph.D., Assistant Professor

*(Biological and Agricultural Engineering; Food Science and Technology)*

Irwin Donis-Gonzalez, Ph.D., Assistant Extension Specialist

Zhiliang (Julia) Fan, Ph.D., Associate Professor

Fadi A. Fathallah, Ph.D., Professor

D. Ken Giles, Ph.D., Professor

Mark E. Grismer, Ph.D., Professor

(Land, Air and Water Resources)

Bryan M. Jenkins, Ph.D., Professor

Tina Jeoh, Ph.D., Associate Professor

Michael J. McCarthy, Ph.D., Professor

*(Biological and Agricultural Engineering; Food Science and Technology)*

Nitin Nitin, Ph.D., Associate Professor

*(Biological and Agricultural Engineering; Food Science and Technology)*

Ning Pan, Ph.D., Professor

*(Biological and Agricultural Engineering; Textiles and Clothing)*

David C. Slaughter, Ph.D., Professor

Shrinivasa K. Upadhyaya, Ph.D., Professor

Jean S. VanderGheynst, Ph.D., Professor

Stavros G. Vougioukas, Ph.D., Assistant Professor

Ruihong Zhang, Ph.D., Professor

**Emeriti Faculty**

William J. Chancellor, Ph.D., Professor Emeritus

Pictiaw (Paul) Chen, Ph.D., Professor Emeritus

Michael J. Delwiche, Ph.D., Professor Emeritus

Roger E. Garrett, Ph.D., Professor Emeritus

John R. Goss, M.S., Professor Emeritus

Bruce R. Hartsough, Ph.D., Professor Emeritus

David J. Hills, Ph.D., Professor Emeritus

John M. Krochta, Ph.D., Professor Emeritus

Miguel A. Mariño, Ph.D., Professor Emeritus

Kathryn McCarthy, Ph.D., Professor Emeritus

R. Larry Merson, Ph.D., Professor Emeritus

John A. Miles, Ph.D., Professor Emeritus

Stanton R. Morrison, Ph.D., Professor Emeritus

Raul H. Piedrahita, Ph.D., Professor Emeritus

Richard E. Plant, Ph.D., Professor Emeritus

James W. Rumsey, M.S., Senior Lecturer Emeritus

Thomas R. Rumsey, Ph.D., Professor Emeritus

Verne H. Scott, Ph.D., Professor Emeritus

R. Paul Singh, Ph.D., Distinguished Professor Emeritus

James F. Thompson, M.S., Extension Specialist Emeritus

Wesley W. Wallender, Ph.D., Professor Emeritus

Wesley E. Yates, M.S., Professor Emeritus

**Affiliated Faculty**

Tien-Chieh Hung, Ph.D., Assistant Adjunct Professor

Kurt Kornbluth, Ph.D., Assistant Adjunct Professor

Zhongli Pan, Ph.D., Adjunct Professor

Herbert Scher, Ph.D., Professional Researcher

Mir S. Shafii, Ph.D., Lecturer

**Mission.** The Department of Biological and Agricultural Engineering is dedicated to the advancement of the discipline of biological engineering and to the conduct of research under its many diverse areas of application. Biological engineering or biological systems engineering is the biology-based engineering discipline that integrates life sciences with engineering in the advancement and application of fundamental concepts of biological systems from molecular to ecosystem levels. Within this discipline, our faculty members work in a range of research areas including biotechnology engineering, agricultural and natural resources engineering, and food engineering.

The mission of the Department of Biological and Agricultural Engineering is to discover, develop, apply, and disseminate knowledge for the sustainable production, management, and use of biological materials, and to educate students for this work.

**Objectives.** We educate students in the fundamentals of mathematics, physical and biological sciences, and engineering, balanced with the application of principles to practical problems. We teach students to develop skills for solving engineering problems in biological systems through use of appropriate analysis, synthesis, and engineering design techniques. We prepare students for entry into engineering practice and graduate education, as well as for engagement in life-long learning. We foster the ability of our students to collaborate and communicate effectively, and provide an awareness of the importance of economics, professional responsibility, and the environment.

Students graduating with a B.S. degree in Biological Systems Engineering from UC Davis are prepared to:

- Apply life sciences in engineering at the biochemical, cellular, organism, and ecosystem levels,
- Solve biological systems engineering problems while employed in the private or public sector,
- Consider the environmental and social consequences of their engineering activities,
- Communicate effectively with professional colleagues and public constituencies,
- Act in an ethical manner, and
- Continue their education in a changing professional world.

**The Biological Systems Engineering Undergraduate Program**

Biological Systems Engineering is an engineering major that uses biology as its main scientific base. With rapid advances in biology and biotechnology, engineers are needed to work side by side with life

scientists to bring laboratory developments into commercial production or field application. Industries in bioenergy, bioprocessing, biotechnology, food processing, aquaculture, agriculture, plant production, animal production, and forest production all need engineers with strong training in biology. The heightened concern for environmental resources and their preservation generates many engineering opportunities as society strives to maintain balance within the biosphere.

In the freshman and sophomore years, the Biological Systems Engineering major requires sequences of courses in mathematics, physics, chemistry, engineering science, and humanities, similar to all accredited engineering programs. In addition to these course sequences, the Biological Systems Engineering major also requires courses in the biological sciences. Exclusive of General Education units, the Biological Systems Engineering major requires a minimum of 161 units (90 units in the lower division; 71 units in the upper division).

Biological Systems Engineering graduates take jobs in the biotechnology, energy, food, and medical industries; work for state and federal agencies; or pursue graduate work. Students also can use the program as a pathway to professional schools in medicine, veterinary medicine, dentistry, or business.

The Biological Systems Engineering program is accredited by the Engineering Accreditation Commission of ABET; see <http://www.abet.org>.

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

#### **Lower Division Required Courses**

	UNITS
Mathematics 21A-21B-21C-21D .....	16
Mathematics 22A-22B .....	6
Physics 9A-9B-9C .....	15
Chemistry 2A-2B .....	10
Chemistry 8A or 118A .....	2 or 4
Chemistry 8B or 118B .....	4
Biological Sciences 2A-2B-2C .....	15
Engineering 6, 35, 17 .....	12
Biological Systems Engineering 1 .....	4
Biological Systems Engineering 75 .....	4
University Writing Program 1, 1Y or 1V (grade of C- or better is required) .....	4
Communication 1 or 3 .....	4

#### **Upper Division Requirements:**

If your career objective is a professional degree in the health sciences (e.g., medicine, veterinary medicine, or dentistry), you should consult with advisers from the appropriate school to plan for successful admission and to ensure that you take specific courses that may be required and that you have the necessary experience. The upper division requirements are listed following the areas of specialization:

- Biotechnology Engineering
- Agricultural and Natural Resources Engineering
- Food Engineering

#### **Areas of Specialization**

**Biotechnology Engineering.** Biotechnology involves the handling and manipulation of living organisms or their components to produce useful products. Students specializing in biotechnology engineering integrate analysis and design with applied biology to solve problems in renewable energy production, large-scale biotechnical production, control of biological systems, and bio-based materials production.

Students may focus on the mechanisms and processes for the sustainable production and use of energy from renewable biological sources. Students may also focus on the challenges in scaling up laboratory developments to industrial production, including production, packaging, and application of biocontrol agents for plant pests and diseases; genetically altered plants; plant materials and food products; and microbial production of biological

products, tissue culture, and bioremediation. Students may also focus on the development of biosensors to detect microorganisms and specific substances, useful in the development of products based on biological processes and materials.

Biotechnical engineers work in the biotech industries on process design and operation, scale-up, and instrumentation and control.

#### Recommended biological science electives:

- Biological Sciences 101, 102, 103
- Microbiology 102
- Molecular and Cellular Biology 120L
- Plant Biology 113

#### Recommended engineering electives:

- Biological Systems Engineering 161
- Chemical Engineering 161B, 161C, 161L
- Civil and Environmental Engineering 143, 148A, 149, 150, 153
- Engineering 180
- Mechanical Engineering 161, 162, 163

**Suggested advisers.** J. Fan, K. Giles, M. Grismer, B. Jenkins, T. Jeoh, N. Nitin, N. Pan, D. Slaughter, J. VanderGheynst, R. Zhang

#### **Agricultural and Natural Resources Engineering.**

With the world population expected to grow over the next several decades, major concerns lie with meeting the needs of agriculture and with the sustainable use of limited natural resources. Students specializing in agricultural and natural resources engineering combine analysis and design with applied biology to solve problems in producing, transporting, and processing biological products leading to food, fiber, energy, pharmaceuticals, and other human needs.

Students may focus on automation and control of field operations and engineered systems, robotics, and on the biomechanics of humans and animals. They may also focus on engineering issues related to the sustainable use of natural resources, particularly energy and water, but also land and air. Agricultural and natural resources engineers design machinery, processes, and systems for productive plant and animal culture, while improving overall sustainability.

Agricultural and natural resources engineers are employed as practicing professionals and managers with agricultural producers, equipment manufacturers, irrigation districts, food processors, consulting engineering firms, start-up companies, and government agencies. Graduates with interest in biomechanics work in industry on the design, evaluation, and application of human-centered devices and systems, as well as on improving worker health and safety.

#### Recommended biological science electives:

- Animal Emphasis*
- Avian Sciences 100
- Animal Science 143, 144, 146
- Neurobiology, Physiology, and Behavior 101
- Soil Science 100

#### *Aquaculture Emphasis*

- Animal Science 118, 131, 136A
- Applied Biological Systems Technology 163
- Wildlife, Fish, and Conservation Biology 120, 121

#### *Biomechanics Emphasis*

- Biological Sciences 102
- Neurobiology, Physiology and Behavior 101
- Exercise Biology 103
- Cell Biology and Human Anatomy 101

#### *Plant Emphasis*

- Entomology 100
- Environmental Horticulture 102
- Environmental Science and Policy 100
- Environmental Toxicology 101
- Hydrologic Sciences 124
- Microbiology 120
- Plant Biology 111

#### Soil Science 100

- Plant Sciences 101, 110A, 114, 142

#### Recommended engineering electives:

- Biological Systems Engineering 128, 145
- Biomedical Engineering 109, 116, 126
- Civil and Environmental Engineering 140, 141, 142, 144, 145, 148A, 171
- Engineering 111, 121, 180

#### Additional recommended electives:

- Applied Biological Systems Technology 150, 161, 165

**Suggested Advisers.** J. Fan, F. Fathallah, K. Giles, M. Grismer, T.C. Hung, B. Jenkins, K. Kornbluth, D. Slaughter, S. Upadhyaya, S. Vougioukas, J. VanderGheynst, R. Zhang

**Food Engineering.** Producing the food we eat every day constitutes the largest industrial sector of the U.S. economy, and this production involves the work of engineers in a wide variety of food industries, both at home and around the world. Students specializing in food engineering design food processes and operate equipment and facilities for production of high quality, safe, and nutritious food with minimal impact of these operations on the environment.

Students learn to apply engineering principles and concepts to handle, store, process, package, and distribute food and related products. In addition to engineering principles, the food engineering specialization provides an understanding of the chemical, biochemical, microbiological, and physical characteristics of food. Students study concepts of food refrigeration, freezing, thermal processing, drying, and other food operations, food digestion, and health and nutrition in food system design.

Food engineers work as practicing engineers, scientists, and managers in the food industry.

#### Recommended biological science electives:

- Biological Sciences 101, 102, 103
- Environmental Science and Policy 110
- Environmental Toxicology 101
- Food Science and Technology 104, 104L, 119, 128
- Plant Sciences 172

#### Recommended engineering electives:

- Biological Systems Engineering 161
- Chemical Engineering 157
- Mechanical Engineering 171, 172

**Suggested Advisers.** G. Bornhorst, J. de Moura Bell, T. Jeoh, M. McCarthy, N. Nitin, Z. Pan, D. Slaughter

#### **Upper Division Required Courses**

	UNITS
Engineering 100, 102, 104 105, 106.....	18
Biological Systems Engineering 103, 125, 127, 130, 165, 170A, 170B, 170BL, 170C, 170CL.....	29
Biological Systems Engineering electives—Select a minimum of 4 units from all upper division Biological Systems Engineering courses not otherwise required, with the exception of Biological Systems Engineering courses 189-199.....	4
Statistics 100.....	4
Engineering electives—Select a minimum of three units. All upper division courses offered by the College of Engineering may be taken as engineering electives with the exception of the following:	
Civil and Environmental Engineering 123, Computer Science Engineering 188, Engineering 103, 160, all courses numbered 190-197 and 199 (except Engineering 190, which may be taken for 2 units of engineering elective credit).....	3
Biological science electives—All upper-division courses in the College of Biological Sciences (with the exception of Biological Sciences 132, Evolution and Ecology 175,	

**Fall 2011 and on Revised General Education (GE): AH=Arts and Humanities; SE=Science and Engineering; SS=Social Sciences;**

**ACGH=American Cultures; DD=Domestic Diversity; OL=Oral Skills; QL=Quantitative; SL=Scientific; VL=Visual; WC=World Cultures; WE=Writing Experience**

**Pre-Fall 2011 General Education (GE): ArtHum=Arts and Humanities; SciEng=Science and Engineering; SocSci=Social Sciences; Div=Domestic Diversity; Wrt=Writing Experience**

**Quarter Offered: F=Fall, W=Winter, S=Spring, Su=Summer; 2017-2018 offering in parentheses**

Exercise Biology 102, 112, 115, 118 through 149L, Microbiology 100 and all courses numbered 190-199 may be used as biological science electives. The following courses may also be taken as biological science electives: Applied Biological Systems Technology 161; Animal Science 118, 143, 144, 146; Agricultural Management and Rangeland Resources 110A; Atmospheric Science 133; Avian Sciences 100; Cell Biology and Human Anatomy 101, 101L; Entomology 100; Environmental Horticulture 102; Environmental Science Policy and Management 120, 182, 185 (offered at UC Berkeley); Environmental Science and Policy 100, 110, 155; Environmental Toxicology 101, 112A, 131; Food Science and Technology 102A, 104L, 119, 120, 121, 128, 159; Infectious Diseases 141; Soil Science 100; Wildlife, Fish, and Conservation Biology 121. Students may choose other upper division courses with substantial biological content offered by the College of Agricultural and Environmental Sciences; consultation with a faculty adviser and approval by petition is required) .... 3 Upper Division Composition Requirement\* one course from the following: University Writing Program 101, 102B, 102E, 102F, 102G, 104A, 104E, 104F, 104T (grade of C- or better is required) ..... 4

\*The Upper-Division composition exam administered by the College of Letters and Sciences cannot be used to satisfy the upper-division composition requirement for students in the Biological Systems Engineering program.

**Master Undergraduate Adviser.** T. Jeoh

### Energy Minor Programs

There is an urgent need to develop and commercialize technologies for the sustainable conversion and use of energy. The goal of these minors is to prepare students for careers that require training in energy science and technology, efficiency, and policy. Clean technologies and green technologies including energy are some of the fastest growing markets for new investments. Well trained individuals in all related fields are needed to provide the level of expertise required to advance technology and policy and to satisfy national and global objectives for greater energy sustainability. The minors are designed to accommodate persons of diverse backgrounds with educational interests in areas that may include engineering, science, policy, economics, planning, and management.

### Energy Science and Technology Minor

All courses must be taken for a letter grade. A grade of C- or better is required for all courses used to satisfy minor requirements with an overall GPA in the required minor courses of 2.000 or better.

#### Minor Requirements:

UNITS

<b>Energy Science and Technology.....</b>	<b>20</b>
Engineering 105 or Chemical Engineering 152B .....	4
Engineering 188.....	4
Select 12 units from: Biological Systems Engineering 161; Chemical Engineering 146, 158C, 161A, 161B, 161L, 166; Civil and Environmental Engineering 125, 143, 162, 163; Mechanical Engineering 161; Agricultural and Resource Economics 175; Food Science and Technology 123; Applied Biological Systems Technology 182; Atmospheric Science 116; Plant Science 101; Environmental Science and Policy 167 .....	12

**Minor Advisers.** B. Jenkins (Department of Biological and Agricultural Engineering), K. McDonald (Department of Chemical Engineering), C. van Dam

(Department of Mechanical and Aerospace Engineering)

### Energy Policy Minor

All courses must be taken for a letter grade. A grade of C- or better is required for all courses used to satisfy the minor requirements with an overall GPA in the required minor courses of 2.000 or better.

#### Minor Requirements:

UNITS

<b>Energy Policy.....</b>	<b>18</b>
---------------------------	-----------

Engineering 188 and Environmental Science and Policy 167 .....	8
Select 10 units from: Civil Engineering 125; Environmental Science and Policy 171, 163, 168A, 169B; Political Science 105, 109, 122, 164 143, 162, 164.....	10

**Minor Advisers.** D. Niemeier (Department of Civil and Environmental Engineering), J. Ogden (Environmental Science and Policy)

### Energy Efficiency Minor

All courses must be taken for a letter grade. A grade of C- or better is required for all courses used to satisfy the minor requirements with overall GPA in the required minor courses of 2.000 or better.

#### Minor Requirements:

UNITS

<b>Energy Efficiency.....</b>	<b>20</b>
-------------------------------	-----------

Engineering 188 and Civil Engineering 125.....	8
Select 12 units from: Civil Engineering 126, 127, 128, 143; Environmental Science and Policy 167; Design 136A, 136B, 137A .....	12

**Minor Advisers.** F. Loge (Civil and Environmental Engineering), D. Sperling (Institute of Transportation Studies), M. Modera (Western Cooling Efficiency Center)

### The Graduate Program in Biological Systems Engineering

Integrated B.S./M.S., M.S., M.Engr., D.Engr., and Ph.D. in Biological Systems Engineering  
Designated Ph.D. emphasis available in Biotechnology  
<http://bae.engineering.ucdavis.edu>  
530-752-0102

Graduate students in Biological Systems Engineering focus on finding economically and environmentally sustainable solutions to many of the most important global issues of our time—the safety, security and abundance of our food, detection of pathogens, development of bioenergy and other sustainable energy systems, control of insect-borne disease and damage, as well as the preservation of our land, air and water resources.

We enjoy the strategic advantage of being located in California, the national leader in agricultural production and crop diversity, and a major center for biotechnology. With the unique status of belonging to both the College of Engineering and the College of Agricultural and Environmental Sciences, the program benefits from a wide diversity of collaborations across multiple disciplines. We interact with colleagues in both engineering and the life sciences to create multidisciplinary approaches to our teaching and research. Students benefit from this dynamic environment that combines the strengths of nationally ranked engineering, agricultural and environmental programs.

Financial support is available in the form of research assistantships, teaching assistantships, fellowships and financial aid.

#### Research Highlights:

- Automation and Control
- Bioenvironmental engineering
- Renewable energy

### Industrial biotechnology

- Food safety
- Biosensors
- Bioprocess engineering
- Bioinstrumentation
- Ergonomics, health and safety
- Aquacultural engineering
- Ecological systems engineering
- Food engineering
- Forest and fiber engineering
- Postharvest engineering
- Remote sensing
- Robotics and autonomous systems
- Soil and water engineering
- Machine systems and precision agriculture

### Research Facilities and Partnerships:

- Agricultural Ergonomics Research Center
- Fish Conservation and Culture Laboratory
- GIS Visualization Lab
- Energy Institute
- Bodega Marine Lab
- Western Center for Agricultural Equipment

Complete information is available on the departmental website.

### Courses in Engineering: Biological Systems (EBS)

#### Lower Division

##### 1. Foundations of Biological Systems Engineering (4)

Lecture—2 hours; laboratory—3 hours; project—3 hours. Restricted to students in Biological Systems Engineering. Introduction to engineering and the engineering design process with examples drawn from the field of biological systems engineering. Introduction to computer-aided design and mechanical fabrication of designs. Students work on a quarter-long group design project. GE credit: SciEng | OL, QL, SE, SL, VL.—F. (F.) Bornhorst, Fatihah, Jenkins

##### 75. Properties of Materials in Biological Systems (4)

Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 2A; Physics 9C (may be taken concurrently). Properties of typical biological materials; composition and structure with emphasis on the effects of physical and biochemical properties on design of engineered systems; interactions of biological materials with typical engineering materials. GE credit: SciEng | QL, SE, SL, VL, WE.—W. (W.) Slaughter, Zicari

##### 90C. Research Group Conference in Biological Systems Engineering (1)

Discussion—1 hour. Prerequisite: lower division standing in Biological Systems Engineering or Food Engineering; consent of instructor. Research group conference. May be repeated for credit. (P/NP grading only.) GE credit: SE.—F. W. S. (F. W. S.)

##### 92. Internship in Biological Systems Engineering (1-5)

Internship. Prerequisite: lower division standing; project approval prior to period of internship. Supervised work experience in biological systems engineering. May be repeated for credit. (P/NP grading only.) GE credit: SE.

##### 98. Directed Group Study (1-5)

Prerequisite: consent of instructor. Group study of selected topics; restricted to lower division students. (P/NP grading only.) GE credit: SE.

##### 99. Special Study for Lower Division Students (1-5)

(P/NP grading only.) GE credit: SE.

**Upper Division****103. Fluid Mechanics Fundamentals (4)**

Lecture—4 hours. Prerequisite: Physics 9B. Fluid mechanics axioms, fluid statics, kinematics, velocity fields for one-dimensional incompressible flow and boundary layers, turbulent flow time averaging, potential flow, dimensional analysis, and macroscopic balances to solve a range of practical problems. (Same course as Hydrologic Science 103N.) GE credit: SciEng | QL, SE, VL, WE.—W. (W.)

**114. Principles of Field Machinery Design (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 102, 104. Traction and stability of vehicles with wheels or tracks. Operating principles of field machines and basic mechanisms used in their design. GE credit: SciEng | QL, SE, VL, WE.—S.

**115. Forest Engineering (3)**

Lecture—3 hours. Prerequisite: Engineering 104. Applications of engineering principles to problems in forestry including those in forest regeneration, harvesting, residue utilization, and transportation. GE credit: SciEng | QL, SE, SL, VL.—S. (S.) Hartsough

**120. Power Systems Design (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 17, 102, 103, 105. Design and performance of power devices and systems including combustion engines, electric generators and motors, fluid power systems, fuels, and emerging technologies. Selection of units for power matching and optimum performance. GE credit: SciEng | QL, SE, SL, VL, WE.—F. (F.)

**125. Heat Transfer in Biological Systems (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 103; Engineering 105; Biological Sciences 2A, 2B and 2C. Fundamentals of heat transfer with application to biological systems. Steady and transient heat transfer. Analysis and simulation of heat conduction, convection and radiation. Heat transfer operations. GE credit: SciEng | OL, QL, SE, VL, WE.—S. (S.) Fan, Nitin

**127. Mass Transfer and Kinetics in Biological Systems (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 125. Fundamentals of mass transfer and kinetics in biological systems. Molecular diffusion and convection. Thermodynamics and bioenergetics. Biological and chemical rate equations. Heterogeneous kinetics. Batch and continuous reaction processes. GE credit: SciEng | QL, SE, VL, WE.—F. (F.) Jeoh

**128. Biomechanics and Ergonomics (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Statistics 100, Engineering 102. Limited enrollment. Anatomical, physiological, and biomechanical bases of physical ergonomics. Human motor capabilities, body mechanics, kinematics and anthropometry. Use of bioinstrumentation, industrial surveillance techniques and the NIOSH lifting guide. Cumulative trauma disorders. Static and dynamic biomechanical modeling. Emphasis on low back, shoulder, and hand/wrist biomechanics. GE credit: SciEng | QL, SE, SL, VL, WE.—S. (S.) Fathallah

**130. Modeling of Dynamic Processes in Biological Systems (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 75; Engineering 6 or Computer Science & Engineering 30; grade of C- or better in Mathematics 22B required for enrollment eligibility. Techniques for modeling processes through mass and energy balance, rate equations, and equations of state. Computer problem solution of models. Example models include package design, evaporation, respiration heating, thermal processing of foods, and plant growth. GE credit: SciEng | OL, QL, SE, SL, VL, WE.—W. (W.) Fan, Upadhyaya

**135. Bioenvironmental Engineering (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 125, 130. Biological responses to environmental conditions. Principles and engineering design of environmental control systems. Overview of envi-

ronmental pollution problems and legal restrictions for biological systems, introduction of environmental quality assessment techniques, and environmental pollution control technologies. GE credit: SciEng | QL, SE, SL, VL, WE.—F. (F.) Zhang

**144. Groundwater Hydrology (4)**

Lecture—4 hours. Prerequisite: Mathematics 16B or 21A; Hydrologic Science 103 or Engineering 103 recommended. Fundamentals of groundwater flow and contaminant hydrology. Occurrence, distribution, and movement of groundwater. Well-flow systems. Aquifer tests. Well construction operation and maintenance. Groundwater exploration and quality assessment. Agricultural threats to groundwater quality: fertilizers, pesticides, and salts. Same course as Hydrologic Science 144. GE credit: SciEng | QL, SE, SL, VL.—F. (F.) Fogg, Harter

**145. Irrigation and Drainage Systems (4)**

Lecture—4 hours. Prerequisite: course 103 or Hydrologic Science 103N. Engineering and scientific principles applied to the design of surface, sprinkle and micro irrigation systems and drainage systems within economic, biological, and environmental constraints. Interaction between irrigation and drainage. GE credit: SciEng | QL, SE, SL, VL, WE.—S. (S.) Giles, Zhang

**147. Runoff, Erosion and Water Quality Management in the Tahoe Basin (3)**

Lecture/laboratory—30 hours; fieldwork—15 hours; discussion—10 hours; term paper. Prerequisite: Physics 7B or 9B, Mathematics 16C or 21C, Civil and Environmental Engineering 142 or Hydrologic Science 141 or Environmental and Resource Sciences 100. Practical hydrology and runoff water quality management from Tahoe Basin slopes. Development of hillslope and riparian restoration concepts, modeling and applications from physical science perspectives including precipitation-runoff relationships, sediment transport, and detention ponds. Five days of instruction in Tahoe City. (Same course as Hydrologic Science 147.) GE credit: SciEng | QL, SE, SL.—Grismer

**161. Kinetics and Bioreactor Design (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 127. Provide the basic principles of reactor design for bioprocess applications. This course emphasizes the following topics: 1) kinetics and reactor engineering principles; 2) bio-reaction kinetics; and 3) bioreactor design. GE credit: SciEng | QL, SE, VL, WE.—W. (W.) Fan, Jeoh

**165. Bioinstrumentation and Control (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 100. Instrumentation and control for biological production systems. Measurement system concepts, instrumentation and transducers for sensing physical and biological parameters, data acquisition and control. GE credit: SciEng | QL, SE, SL, VL, WE.—F. (F.) Slaughter, Vougioukas

**170A. Engineering Design and Professional Responsibilities (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 1, Engineering 102, 104. Engineering design including professional responsibilities. Emphasis on project selection, data sources, specifications, human factors, biological materials, safety systems, and professionalism. Detailed design proposals will be developed for courses 170B and 170BL. GE credit: SciEng | OL, QL, SE, SL, VL, WE.—F. (F.) Giles, Zhang

**170B. Engineering Projects: Design (2)**

Discussion—2 hours. Prerequisite: course 170A; course 170BL required concurrently. Individual or group projects involving the design of devices, structures, or systems to solve specific engineering problems in biological systems. Project for study is jointly selected by student and instructor. GE credit: SciEng | OL, QL, SE, SL, VL, WE.—W. (W.) Giles, Zhang

**170BL. Engineering Projects: Design Laboratory (1)**

Laboratory—3 hours. Prerequisite: course 170B required concurrently. Individual or group projects involving the design of devices, structures, or systems to solve specific engineering problems in biological systems. GE credit: SciEng | OL, QL, SE, SL, VL, WE.—W. (W.)

**170C. Engineering Projects: Design Evaluation (1)**

Discussion—1 hour. Prerequisite: course 170B; required to enroll in course 170CL concurrently. Individual or group projects involving the fabrication, assembly and testing of components, devices, structures, or systems designed to solve specific engineering problems in biological systems. Project for study previously selected by student and instructor in course 170B. GE credit: SciEng | OL, QL, SE, SL, VL, WE.—S. (S.) Giles, Zhang

**170CL. Engineering Projects: Design Evaluation (2)**

Laboratory—6 hours. Prerequisite: required to enroll in course 170C concurrently. Individual or group projects involving the fabrication, assembly and testing of components, devices, structures, or systems designed to solve specific engineering problems in biological systems. GE credit: SciEng | OL, QL, SE, SL, VL, WE.—S. (S.)

**175. Rheology of Biological Materials (3)**

Lecture—3 hours. Prerequisite: course 103 or Engineering 103. Fluid and solid rheology, viscoelastic behavior of foods and other biological materials, and application of rheological properties to food and biological systems (i.e., pipeline design, extrusion, mixing, coating). GE credit: SciEng | QL, SE, VL, WE.—W. (W.) K. McCarthy

**189A. Special Topics in Biological Systems Engineering: Agricultural Engineering (1-5)**

Prerequisite: upper division standing in engineering; consent of instructor. Special topics in Agricultural Engineering. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189B. Special Topics in Biological Systems Engineering: Aquacultural Engineering (1-5)**

Prerequisite: upper division standing in engineering; consent of instructor. Special topics in Aquacultural Engineering. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189C. Special Topics in Biological Systems Engineering: Biomedical Engineering (1-5)**

Prerequisite: upper division standing in engineering; consent of instructor. Special topics in Biomedical Engineering. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189D. Special Topics in Biological Systems Engineering: Biotechnical Engineering (1-5)**

Prerequisite: upper division standing in engineering; consent of instructor. Special topics in Biotechnical Engineering. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189E. Special Topics in Biological Systems Engineering: Ecological Systems Engineering (1-5)**

Prerequisite: upper division standing in engineering; consent of instructor. Special topics in Ecological Systems Engineering. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189F. Special Topics in Biological Systems Engineering: Food Engineering (1-5)**

Prerequisite: upper division standing in engineering; consent of instructor. Special topics in Food Engineering. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189G. Special Topics in Biological Systems Engineering: Forest Engineering (1-5)**

Prerequisite: upper division standing in engineering; consent of instructor. Special topics in Forest Engineering. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**190C. Research Group Conference in Biological Systems Engineering (1)**

Discussion—1 hour. Prerequisite: upper division standing in Biological Systems Engineering or Food Engineering; consent of instructor. Research group conference. May be repeated for credit. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

**192. Internship in Biological Systems Engineering (1-5)**

Internship. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work experience in biological systems engineering. May be repeated for credit. (P/NP grading only.) GE credit: SE.

**197T. Tutoring in Biological Systems Engineering (1-5)**

Tutorial—3-15 hours. Prerequisite: upper division standing. Tutoring individual students, leading small voluntary discussion groups, or assisting the instructor in laboratories affiliated with one of the department's regular courses. May be repeated for credit if topic differs. (P/NP grading only.) GE credit: SE.

**198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) GE credit: SE.

**199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.) GE credit: SE.

**Graduate****200. Research Methods in Biological Systems Engineering (2)**

Lecture—2 hours. Prerequisite: graduate standing. Planning, execution and reporting of research projects. Literature review techniques and proposal preparation. Record keeping and patents. Uncertainty analysis in experiments and computations. Graphic analysis. Oral and written presentation of research results, manuscript preparation, submission and review.—F. (F.) Zhang, Giles

**205. Continuum Mechanics of Natural Systems (4)**

Lecture/discussion—4 hours. Prerequisite: Mathematics 21D and 22B, Physics 9B. Continuum mechanics of static and dynamic air, water, earth and biological systems using hydraulic, heat and electrical conductivity; diffusivity; dispersion; strain; stress; deformation gradient; velocity gradient; stretch and spin tensors. (Same course as Hydrologic Science 205).—S.

**215. Soil-Machine Relations in Tillage and Traction (3)**

Lecture—3 hours. Prerequisite: course 114. Mechanics of interactions between agricultural soils and tillage and traction devices; determination of relevant physical properties of soil; analyses of stress and strains in soil due to machine-applied loads; experimental and analytical methods for synthesizing characteristics of overall systems. Offered in alternate years.—W. Upadhyaya

**216. Energy Systems (4)**

Lecture/discussion—4 hours. Prerequisite: course 105. Theory and application of energy systems. System analysis including input-output analysis, energy balances, thermodynamic availability, economics, environmental considerations. Energy conversion systems and devices including cogeneration, heat pump, fuel cell, hydroelectric, wind, photovoltaic, and biomass conversion processes. Offered in alternate years.—W. Jenkins

**218. Solar Thermal Engineering (4)**

Lecture/discussion—4 hours. Prerequisite: course in heat transfer. Analysis and design of solar energy collection systems. Sun-earth geometry and estimation of solar radiation. Steady-state and dynamic models of solar collectors. Modeling of thermal energy storage devices. Computer simulation. Offered in alternate years.—S. Jenkins

**220. Pilot Plant Operations in Aquacultural Engineering (3)**

Lecture—1 hour; laboratory—6 hours. Prerequisite: Civil Engineering 243A-243B or Applied Biological Systems Technology 161, 163. Topics in water treatment as they apply to aquaculture operations. Laboratory study of unit operations in aquaculture. Offered in alternate years.—(F.) Hung

**228. Occupational Musculoskeletal Disorders (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: graduate standing and consent of instructor. Epidemiology and etiology of occupational musculoskeletal disorders (MSDs) with focus on low back and upper extremities disorders; anatomical and biomechanical functions of lower back and upper extremities; MSDs risk factors assessment and control; research opportunities related to MSDs.—S. (S.) Fathallah

**231. Mass Transfer in Food and Biological Systems (3)**

Lecture/discussion—3 hours. Prerequisite: graduate standing. Application of mass transfer principles to food and biological systems. Study of mass transfer affecting food quality and shelf life. Analysis of mass transfer in polymer films used for coating and packaging foods and controlling release of biologically active compounds. Offered in alternate years.—(W.)

**233. Analysis of Processing Operations: Drying and Evaporation (3)**

Lecture—3 hours. Prerequisite: course in food or process engineering, familiarity with FORTRAN. Diffusion theory in drying of solids. Analysis of fixed-bed and continuous-flow dryers. Steady-state and dynamic models to predict performance evaporators: multiple effects, mechanical and thermal recompression, control systems. Offered in alternate years.—(W.)

**235. Advanced Analysis of Unit Operations in Food and Biological Engineering (3)**

Lecture—3 hours. Prerequisite: course 132. Analysis and design of food processing operations. Steady state and dynamic heat and mass transfer models for operations involving phase change such as freezing and frying. Separation processes including membrane applications in food and fermentation systems.—(S.)

**237. Thermal Process Design (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: course in heat transfer. Heat transfer and biological basis for design of heat sterilization of foods and other biological materials in containers or in bulk. Offered in alternate years.—S.

**239. Magnetic Resonance Imaging in Biological Systems (3)**

Lecture—3 hours. Prerequisite: graduate standing. Theory and applications of magnetic resonance imaging to biological systems. Classical Bloch model of magnetic resonance. Applications to be studied are drying of fruits, flow of food suspensions, diffusion of moisture, and structure of foods. Offered in alternate years.—F. M. McCarthy

**240. Infiltration and Drainage (3)**

Lecture—3 hours. Prerequisite: Soil Science 107, Engineering 103. Aspects of multi-phase flow in soils and their application to infiltration and immiscible displacement problems. Gas phase transport and entrapment during infiltration, and oil-water-gas displacement will be considered. Offered in alternate years.—W. Grismer

**241. Sprinkle and Trickle Irrigation Systems (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 145/Hydrologic Science 115. Computerized design of sprinkle and trickle irrigation systems. Consideration of emitter mechanics, distribution functions and water yield functions. Offered in alternate years.—S.

**242. Hydraulics of Surface Irrigation (3)**

Lecture—3 hours. Prerequisite: course 145, Hydrologic Science 115. Mathematical models of surface-irrigation systems for prediction of the ultimate dispo-

sition of water flowing onto a field. Quantity of runoff and distribution of infiltrated water over field length as a function of slope, roughness, infiltration and inflow rates. Offered in alternate years.—(S.)

**243. Water Resource Planning and Management (3)**

Lecture—3 hours. Prerequisite: Hydrologic Science 141 or the equivalent. Applications of deterministic and stochastic mathematical programming techniques to water resource planning, analysis, design, and management. Water allocation, capacity expansion, and reservoir operation. Conjunctive use of surface water and groundwater. Water quality management. Irrigation planning and operation models. (Same course as Hydrologic Science 243.) Offered in alternate years—(F.)

**245. Waste Management for Biological Production Systems (3)**

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Characterization of solid and liquid wastes from animal, crop, and food production systems. Study of methods and system design for handling, treatment, and disposal/utilization of these materials.—W. (W.) Zhang

**260. Analog Instrumentation (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 100. Instrument characteristics: generalized instrument models, calibration, and frequency response. Signal conditioning: operational amplifier circuits, filtering, and noise. Transducers: motion, force, pressure, flow, temperature, and photoelectric. Offered in alternate years.—W.

**262. Computer Interfacing and Control (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 100, course 165. Procedural and object-oriented programming in C++, analog and digital signal conversion, data acquisition and computer control. Offered in alternate years.—(S.) Delwiche

**265. Design and Analysis of Engineering Experiments (5)**

Lecture—3 hours; lecture/discussion—2 hours. Prerequisite: Statistics 100, Agricultural Systems and Environment 120, or an introductory course in statistics. Simple linear, multiple, and polynomial regression, correlation, residuals, model selection, one-way ANOVA, fixed and random effect models, sample size, multiple comparisons, randomized block, repeated measures, and Latin square designs, factorial experiments, nested design and subsampling, split-plot design, statistical software packages.—S. (S.) Slaughter, Upadhyaya

**267. Renewable Bioprocessing (3)**

Lecture—3 hours. Prerequisite: course 160, Biological Sciences 101 or Microbiology 102. Applications of biotechnology and bioprocess engineering toward the use of agricultural and renewable feedstocks for the production of biochemicals. Design and modeling of microbial- and plant-based production systems including associated fermentation, extraction, and purification processes. Offered in alternate years.—F. VanderGheynst

**268. Polysaccharides Surface Interactions (3)**

Lecture—3 hours. Prerequisite: graduate students in science or engineering. Study of fundamental surface science theories as applied to physical and chemical interactions of carbohydrates and polysaccharides. Offered in alternate years.—F. Jeoh

**270. Modeling and Analysis of Biological and Physical Systems (3)**

Lecture—3 hours. Prerequisite: familiarity with a programming language. Mathematical modeling of biological systems: model development; analytical and numerical solutions. Case studies from various specializations within biological and agricultural engineering. Offered in alternate years.—S. Upadhyaya

**275. Physical Properties of Biological Materials (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Selected topics on physical properties, such as mechanical, optical, rheological,

and aerodynamic properties, as related to the design of harvesting, handling, sorting, and processing equipment. Techniques for measuring and recording physical properties of biological materials. Offered in alternate years.—S. M. McCarthy, Nitin

#### **289A. Selected Topics in Biological Systems Engineering; Animal Systems Engineering (1-5)**

Variable—1-5 hours. Prerequisite: consent of instructor. Special topics in Animal Systems Engineering. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

#### **289B. Selected Topics in Biological Systems Engineering; Aquacultural Engineering (1-5)**

Variable—1-5 hours. Prerequisite: consent of instructor. Special topics in Aquacultural Engineering. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

#### **289C. Selected Topics in Biological Systems Engineering; Biological Engineering (1-5)**

Variable—1-5 hours. Prerequisite: consent of instructor. Special topics in Biological Engineering. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

#### **289D. Selected Topics in Biological Systems Engineering; Energy Systems (1-5)**

Variable—1-5 hours. Prerequisite: consent of instructor. Special topics in Energy Systems. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

#### **289E. Selected Topics in Biological Systems Engineering; Environmental Quality (1-5)**

Variable—1-5 hours. Prerequisite: consent of instructor. Special topics in Environmental Quality. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

#### **289F. Selected Topics in Biological Systems Engineering; Food Engineering (1-5)**

Variable—1-5 hours. Prerequisite: consent of instructor. Special topics in Food Engineering. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

#### **289G. Selected Topics in Biological Systems Engineering; Forest Engineering (1-5)**

Variable—1-5 hours. Prerequisite: consent of instructor. Special topics in Forest Engineering. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

#### **289H. Selected Topics in Biological Systems Engineering; Irrigation and Drainage (1-5)**

Variable—1-5 hours. Prerequisite: consent of instructor. Special topics in Irrigation and Drainage. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

#### **289I. Selected Topics in Biological Systems Engineering; Plant Production and Harvest (1-5)**

Variable—1-5 hours. Prerequisite: consent of instructor. Special topics in Plant Production and Harvest. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

#### **289J. Selected Topics in Biological Systems Engineering; Postharvest Engineering (1-5)**

Variable—1-5 hours. Prerequisite: consent of instructor. Special topics in Postharvest Engineering. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

#### **289K. Selected Topics in Biological Systems Engineering; Sensors and Actuators (1-5)**

Variable—1-5 hours. Prerequisite: consent of instructor. Special topics in Sensors and Actuators. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

#### **290. Seminar (1)**

Seminar—1 hour. Prerequisite: graduate standing. Weekly seminars on recent advances and selected topics in biological systems engineering. Course theme will change from quarter to quarter. May be repeated for credit. (S/U grading only.)

#### **290C. Graduate Research Conference (1)**

Discussion—1 hour. Prerequisite: consent of instructor. Research problems, progress and techniques in biological systems engineering. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

#### **298. Group Study (1-5)**

(S/U grading only.)

#### **Professional**

#### **390. Supervised Teaching in Biological and Agricultural Engineering (1-3)**

Laboratory—3 hours; tutorial—3-9 hours. Prerequisite: graduate standing; consent of instructor. Tutoring and teaching students in undergraduate courses offered in the Department of Biological and Agricultural Engineering. Weekly conferences with instructor; evaluation of teaching. Preparing for and conducting demonstrations, laboratories and discussions. Preparing and grading exams. May be repeated for a total of 6 units. (S/U grading only.)—F, W, S. (F, W, S.)

## **Engineering: Biomedical**

(College of Engineering)

Alyssa Panitch, Chairperson of the Department

**Department Office.** 2303 Genome and Biomedical Sciences Facility 530-752-1033;  
<http://www.bme.ucdavis.edu>

#### **Faculty**

Kyriacos A. Athanasiou, Ph.D., Distinguished Professor (*Biomedical Engineering; Medicine: Orthopaedic Surgery*)

Sharon Aviran, Ph.D., Assistant Professor  
Ramsey D. Badawi, Ph.D., Associate Professor (*Biomedical Engineering; Medicine: Radiology*)

Craig J. Benham, Ph.D., Professor (*Biomedical Engineering; Mathematics; Genome Center*)  
John M. Boone, Ph.D., Professor (*Biomedical Engineering; Medicine: Radiology*)

Ye Chen-Izu, Ph.D., Associate Professor (*Biomedical Engineering; Medicine: Pharmacology and Internal Medicine/Cardiology*)  
Simon R. Cherry, Ph.D., Distinguished Professor (*Biomedical Engineering; and Medicine: Radiology*)

Jennifer H. Choi, Ph.D., Lecturer PSOE

Yong Duan, Ph.D., Professor

Marc T. Facciotti, Ph.D., Associate Professor (*Biomedical Engineering; Genome Center*)  
Katherine W. Ferrara, Ph.D., Distinguished Professor

David P. Fyhrie, Ph.D., Professor (*Biomedical Engineering; Medicine: Orthopaedic Surgery*)  
Volkmar Heinrich, Ph.D., Associate Professor

Stephen M. Howell, M.D., Adjunct Professor

Tonya Kuhl, Ph.D., Professor (*Biomedical Engineering; Chemical Engineering & Materials Science*)  
J. Kent Leach, Ph.D., Professor (*Biomedical Engineering; Medicine: Orthopaedic Surgery*)

Jamal Lewis, Ph.D., Assistant Professor

Angelique Louie, Ph.D., Professor

Laura Marcu, Ph.D., Professor (*Biomedical Engineering; Medicine: Neurological Surgery*)  
Tingrui Pan, Ph.D., Associate Professor

Alyssa Panitch, Ph.D., Professor

Atul N. Parikh, Ph.D., Professor (*Biomedical Engineering; Chemical Engineering & Materials Science*)  
Anthony G. Passerini, Ph.D., Associate Professor

Jinyi Qi, Ph.D., Professor

Alexander Revzin, Ph.D., Professor

David Rocke, Ph.D., Distinguished Professor (*Biomedical Engineering; Medicine: Public Health Sciences*)  
Leonor Saliz, Ph.D., Associate Professor

Michael A. Savageau, Ph.D., Distinguished Professor (*Biomedical Engineering; Microbiology & Molecular Genetics*)

Eduardo A. Silva, Ph.D., Assistant Professor

Scott Simon, Ph.D., Professor

Vivek J. Srinivasan, Ph.D., Assistant Professor

(*Biomedical Engineering; Medicine: Ophthalmology*)

Julie L. Sutcliffe, Ph.D., Associate Professor

(*Biomedical Engineering; Medicine: Hematology and Oncology*)

Cheemeng Tan, Ph.D., Assistant Professor

Soichiro Yamada, Ph.D., Associate Professor

#### **Emeriti Faculty**

Fitz-Roy Curry, Ph.D., Distinguished Professor

(*Biomedical Engineering; Medicine: Physiology and Membrane Biology*)

Maury Hull, Ph.D., Professor Emeritus (*Biomedical Engineering; Mechanical and Aerospace Engineering*)

## **The Biomedical Engineering Undergraduate Major**

The Biomedical Engineering program is accredited by the Engineering Accreditation Commission of ABET; see <http://www.abet.org>.

Biomedical engineering is an interdisciplinary area of study that integrates knowledge from engineering with the biomedical sciences. It is a very diverse field, with biomedical engineers working in systems ranging from medical imaging to the design of artificial organs. Some major research advances in biomedical engineering include the left ventricular assist device (LVAD), artificial joints, kidney dialysis, bioengineered skin, angioplasty, computed tomography (CT), and flexible endoscopes. Students who choose biomedical engineering are interested in being of service to human health but do not routinely interact directly with patients.

The mission of the BS degree program of the Department of Biomedical Engineering is to combine exceptional teaching with state-of-the-art research for the advancement of technologies and computational techniques that meet medical and societal challenges. As a biomedical engineer, you can choose employment opportunities in industry, hospitals, academic research institutes, teaching, national laboratories, or government regulatory agencies.

The educational objectives of our program are that our graduates develop successful careers related to biomedical engineering or another area of the student's choosing, through employment in industry or government, or through pursuit of graduate or professional degrees; and contribute effectively to society through engineering practice, research and development, education, or in governmental, regulatory or legal aspects.

The biomedical engineering curriculum has been designed to provide a solid foundation in mathematics, life and physical sciences, and engineering, and to provide sufficient flexibility in the upper division requirements to encourage students to explore specializations within the field. Our instructional program is designed to impart knowledge of contemporary issues at the forefront of biomedical engineering research. Exclusive of General Education units, the minimum number of units required for the Biomedical Engineering degree is 157.

For information about graduate degree options, see [Biomedical Engineering \(A Graduate Group\)](#), on page 194.

#### **Lower Division Required Courses**

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

#### **UNITS**

Mathematics 21A or 21AH; 21B or 21BH;

21C or 21CH; 21D.....16

Mathematics 22A-22B .....6

Physics 9A or 9HA; 9B, 9C .....15

Chemistry 2A or 2AH; 2B or 2BH, 2C or

2CH .....15

Chemistry 8A or 118A; Chemistry 8B or 118B.....	6
Engineering 6, 17.....	8
University Writing Program 1, 1Y, or 1V, or English 3, or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5 (grade of C- or better required) .....	4
Biological Sciences 2A .....	5
Biomedical Engineering 1, 20 .....	6

**Upper Division Required Courses**

Engineering 100 or Electrical and Computer Engineering 100 .....	3
Engineering 105, 190 .....	7
Biomedical Engineering 116 or Neurobiology Physiology Behavior 101 .....	5
Biomedical Engineering 105, 106, 108, 109, 110A-110B-110L, 111 .....	30
Science electives .....	7
To be chosen according to specialization. Biological Sciences 2B, 2C, Engineering Computer Science 30, 40, Physics 9D, Biomedical Engineering 102, 161A, 161L, 161S, Chemistry 118C or any graded upper division course in the Biological Sciences, Chemistry or Physics that is designated as Science and Engineering topical breadth. Four units of Biomedical Engineering 192 or 199 with the approval of the Biomedical Engineering Undergraduate Committee.	
Engineering electives .....	24
Any graded upper division Biomedical Engineering course (except Biomedical Engineering 102, 161A, 161L, 161S). 4 units of Biomedical Engineering 192 or 199 with the approval of the Biomedical Engineering Undergraduate Committee. No more than four units allowed from lower division coursework. Engineering 4, 35, 45, or 45Y, 102, 103, 104, 104L, 106; Electrical and Computer Engineering 110A, 110B, 118, 130A, 130B, 140A, 140B, 150A, 150B, 157A, 157B, 160; Biological Systems Engineering 128, 130, 165, 175; Chemical Engineering 141, 144, 145A, 145B, 155, 160, 161A, 161B, 161L, 170; Computer Science 124; Materials Science and Engineering 147, 160, 162, 162L, 164, 172, 172L, 174, 174L, 180, 181, 182; Mechanical Engineering 50, 150A, 150B, 151, 152, 154, 165, 171, 172.	

**Upper Division Composition**

Requirement .....	0.4
One course from the following (a grade of C- or better is required): University Writing Program 101; 102B, 102E; 104 A, 104E, 104F, 104I, 104T; or passing the Upper Division Composition Exam.	

**Additional upper division elective policies:**

- 2 units from Chemistry 118A may be applied towards Science electives if 118A is also used to satisfy lower division subject credit.
- 2 units from Electrical and Computer Engineering 100 may be applied towards Engineering electives if Electrical and Computer Engineering 100 is taken to satisfy upper division subject credit.

**Science electives and engineering electives are to be selected in consultation with a staff or faculty adviser.****Biomedical Engineering Minor**

The minor in Biomedical Engineering is restricted to enrolled College of Engineering students. The intent is to build upon their existing core strengths and add expertise in biomedical applications. This additional training would make students more attractive to employers in the medical device industry, and would also position students for graduate training in health related applications of engineering. The minor requires two life sciences courses not typically required for engineering students, one at the cellular level (Biomedical Engineering 102) and the other at

the physiological level (Neurobiology, Physiology, and Behavior 101 or Biomedical Engineering 116). The remaining 12 units are to be selected in consultation with an adviser from the list of upper division Biomedical Engineering courses. Students will be advised to select additional courses to complement their existing curricula. Examples of relevant coursework for different majors are provided as a reference. These listings classify the upper division Biomedical Engineering courses into categories and provide a suggested subset of coursework for the majors most likely to have students interested in health-related applications.

**Minor Requirements:**

All courses must be taken for a letter grade. A grade of C- or better is required for all courses used to satisfy minor requirements with an overall GPA of 2.000 or better in courses required for the minor. No more than one course can be counted towards both the student's major and the minor.

**UNITS****Biomedical Engineering.....21**

Neurobiology, Physiology and Behavior 101 or Biomedical Engineering 116, and	
Biomedical Engineering 102 .....	9
Electives*	
Biomedical Engineering 117, 118, 126, 140, 141, 142, 143, 151, 152, 161A, 161L, 162, 163, 167, 173, 189A, 189B, 189C .....	12

\*Electives to be chosen in consultation with the Biomedical Engineering Departmental Adviser.

**Minor Advisers.** Rosalind Christian, Anthony Pascerini

**Areas of Specialization**

As Biomedical engineering is defined so broadly, specializing in a subfield of engineering can provide more in-depth expertise in a focus area. Through the judicious selection of upper division engineering and science electives, students can create this depth in one of our suggested areas of specialization or in an area of the student's choosing. One of the strengths of the UC Davis program is the flexibility to design one's own emphasis of study. These specializations are neither required nor degree-notated.

**Biomechanics**

This is a broad subfield that includes orthopedic/rehabilitation engineering (including the design of wheelchairs and prosthetics) as well as the study of mechanical forces produced by biological systems. Biomechanics allows a better understanding of the fluid dynamics of blood flow and the forces acting on tissue in the artery to allow the design of better cardiovascular interventions. This field involves more intensive study of mechanics, dynamics and thermodynamics.

**Cellular and Tissue Engineering**

This focus area applies biomedical engineering principles to control behavior at the gene, protein, cell, and tissue level. Scientists in this area can work in diverse areas including cellular therapies, protein production, gene therapy, tissue engineering and regeneration, and biomaterials development. This field can require study in biomedical transport, natural or synthetic biomaterials, pharmacokinetics and pharmacodynamics. It draws heavily from knowledge in the chemical and biological sciences.

**Imaging**

The visualization of anatomical structure, physiological processes, metabolic activity and molecular expression in living tissues is important to accomplish goals that include the diagnosis of disease, the development of new therapeutics, the evaluation of the response to therapeutics, and the guidance of interventional procedures. Our program has a particular strength in molecular imaging, in which molecular-scale events are detected within living systems. An imaging bioengineer can work in areas ranging from developing instruments for imaging, to

creating algorithms for three-dimensional reconstruction of imaging data, to generating new contrast agents for enhancing image quality. Depending upon the area of interest, this field can require further study in electronics signal processing, chemistry or computer programming.

**Medical Devices**

This is a diverse area that can include the development of instruments, apparatuses, machines, implants, or in-vitro reagents intended for use in the diagnosis, treatment or prevention of disease. Biomedical engineers have begun to combine technologies including pharmaceuticals, electronics and mechanical devices in the development of combination medical treatments.

**Systems & Synthetic Biology**

In this area, concepts, principles and techniques from engineering are applied to understand and build biological processes and systems at a fundamental level. Engineers describe biochemical, genetic and mechanical processes mathematically and integrate this information into models of natural and synthetic systems. These models are studied analytically, computationally and statistically to uncover design principles of natural systems and to guide development of methods capable of redirecting normal expression for biotechnological purposes or correcting pathological expression for therapeutic purposes.

**Pre-Medical Students**

Engineering is playing an increasing role in the practice of medicine, and students interested in medicine can focus on the intersection of engineering and medicine. To meet admission requirements for medical school, students must complete extra course work. These courses are in addition to the listed Department of Biomedical Engineering curricular requirements.

**Courses in Biomedical Engineering (BIM)****Lower Division****1. Introduction to Biomedical Engineering (2)**

Lecture—1 hour; laboratory—3 hours. Pass One open to freshmen. Introduction to the field of biomedical engineering with emphasis on design, careers, and specializations, including (1) medical devices (2) cellular & tissue engineering, (3) biomechanics, (4) systems & synthetic biology, and (5) biomedical imaging. GE credit: SciEng | SE. —F. (F.) Choi

**20. Fundamentals of Bioengineering (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: C- or better in Chemistry 2B and Mathematics 21D; Physics 9B. Basic principles of mass, energy and momentum conservation equations applied to solve problems in the biological and medical sciences. Only two units of credit to students who have previously taken Chemical Engineering 51, Engineering 105. GE credit: SciEng | QL, SE, VL. —S. (S.) Choi

**89A. Topics in Biomedical Engineering (1-5)**

Prerequisite: consent of instructor. Restricted to lower division students. Topics in Biomedical Engineering. (A) Cellular and Molecular Engineering. May be repeated for credit when topic differs. GE credit: SciEng | SE.

**89B. Topics in Biomedical Engineering (1-5)**

Prerequisite: consent of instructor. Restricted to lower division students. Topics in Biomedical Engineering. (B) Biomedical Imaging. May be repeated for credit when topic differs. GE credit: SciEng | SE.

**89C. Topics in Biomedical Engineering (1-5)**

Prerequisite: consent of instructor. Restricted to lower division students. Topics in Biomedical Engineering. (C) Biomedical Engineering. May be repeated for credit when topic differs. GE credit: SciEng | SE.

**99. Special Study for Undergraduates (1-5)**

(P/NP grading only.) GE credit: SE.

**Upper Division****102. Quantitative Cell Biology (4)**

Lecture/discussion—4 hours. Prerequisite: Biological Sciences 2A; Chemistry 8B. Open to College of Engineering students only. Fundamental cell biology for bioengineers. Emphasis on physical concepts underlying cellular processes including protein trafficking, cell motility, cell division and cell adhesion. Current topics including cell biology of cancer and stem cells will be discussed. Only two units of credit for students who have completed Biological Sciences 104 or Molecular and Cellular Biology 143. GE credit: SciEng | QL, SE, VL.—F. (F.) Yamada

**105. Probability and Statistics for Biomedical Engineers (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: C- or better in Mathematics 21D; Engineering 6 (may be concurrent). Concepts of probability, random variables and processes, and statistical analysis with applications to engineering problems in biomedical sciences. Includes discrete and continuous random variables, probability distributions and models, hypothesis testing, statistical inference and Matlab applications. Emphasis on BME applications. GE credit: SciEng | QL, SE, VL.—F. (F.) Rocke

**106. Biotransport Phenomena (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: C- or better in course 20; course 116 or Neurobiology, Physiology, and Behavior 101; Physics 9B; Mathematics 22B. Open to Biomedical Engineering majors only. Principles of momentum and mass transfer with applications to biomedical systems; emphasis on basic fluid transport related to blood flow, mass transfer across cell membranes, and the design and analysis of artificial human organs. GE credit: SciEng | QL, SE, SL, VL.—W. (W.) Tan

**107. Mathematical Methods for Biological Systems (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: C- or better in Engineering 6; course 20; Mathematics 22B. Restricted to Biomedical Engineering majors only. Mathematical and computational modeling to solve biomedical problems. Topics include stochastic processes and Monte Carlo simulations, and partial differential equations. Introduced to numerical techniques in MATLAB. Offered irregularly. GE credit: SciEng | QL, SE, VL.

**108. Biomedical Signals and Control (4)**

Lecture—4 hours. Prerequisite: Engineering 6, 17; grade of C- or better in Mathematics 22B. Restricted to Biomedical Engineering majors only. Systems and control theory applied to biomedical engineering problems. Time-domain and frequency-domain analyses of signals and systems, convolution, Laplace and Fourier transforms, transfer function, dynamic behavior of first and second order processes, and design of control systems for biomedical applications. No credit for students who have taken Electrical and Computer Engineering 150A; two units of credit for students who have taken Mechanical Engineering 171. GE credit: SciEng | QL, SE, —S. (S.) Qi

**109. Biomaterials (4)**

Lecture—4 hours. Prerequisite: course 106; Biological Sciences 2A; Chemistry 2C. Restricted to upper division Engineering majors. Introduce important concepts for design, selection and application of biomaterials. Given the interdisciplinary nature of the subject, principles of polymer science, surface science, materials science and biology will be integrated into the course. GE credit: SciEng | SE, SL, VL.—S. (S.) Revzin

**110A. Biomedical Engineering Senior Design Experience (3)**

Lecture/discussion—1 hour; project—6 hours. Prerequisite: course 110L (may be concurrent); course 111 (may be concurrent); consent of instructor. Restricted to senior Biomedical Engineering majors (or by consent of instructor). Application of bioengineering theory and experimental analysis to a design project culminating in the design of a unique solution to a problem. Design may be geared towards current applications in biotechnology or medical technology. Continues in course 110B.

(Deferred grading only, pending completion of sequence.) GE credit: SciEng | SE, OL, SL, VL.—W. (W.) Passerini

**110B. Biomedical Engineering Senior Design Experience (3)**

Lecture/discussion—1 hour; project—6 hours. Prerequisite: course 110A. Application of bioengineering theory and experimental analysis to a design project culminating in the design of a unique solution to a problem. Design may be geared towards current applications in biotechnology or medical technology. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | OL, SE, SL, VL.—S. (S.) Passerini

**110L. Biomedical Engineering Senior Design Lab (2)**

Laboratory—3 hours; laboratory/discussion—2 hours. Prerequisite: courses 105, 108, 109. Restricted to Senior Biomedical Engineering majors. Manufacturing processes, safety, and computer-aided design techniques applied to the fabrication of biomedical devices. Application of bioengineering principles and design theory to a project culminating in completion of a functional prototype that solves a biomedical problem. Continues in 110A. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | SE.—F. W. (F., W.) Passerini

**111. Biomedical Instrumentation Laboratory (6)**

Lecture—4 hours; discussion/laboratory—4 hours. Prerequisite: courses 105, and 108; Engineering 100 or Electrical Engineering 100; course 116 or Neurobiology, Physiology, & Behavior 101. Open to Biomedical Engineering majors only. Basic biomedical signals and sensors. Topics include analog and digital records using electronic, hydrodynamic, and optical sensors, and measurements made at cellular, tissue and whole organism level. GE credit: SciEng | SE.—F. W. (F., W.) Marcu, Pan

**116. Physiology for Biomedical Engineers (5)**

Lecture—2 hours; discussion—3 hours. Prerequisite: C- or better in Biological Sciences 2A; Physics 9C; Mathematics 22B recommended. Basic human physiology for the nervous, musculoskeletal, cardiovascular, respiratory, gastrointestinal, renal, and endocrine systems. Emphasis on small group design projects and presentations in interdisciplinary topics relating biomedical engineering to medical diagnostic and therapeutic applications. GE credit: SciEng | OL, SE, SL, VL, WE.—F. (F.) Silva

**117. Analysis of Molecular and Cellular Networks (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: grade of C- or better in Biological Sciences 2A and Mathematics 22A. Restricted to upper division standing. Network themes in biology, emphasizing metabolic, genetic, and developmental networks. Mathematical and computational methods for analysis of such networks. Elucidation of design principles in natural networks. Engineering and ethical issues in the design of synthetic networks. Offered alternate years. GE credit: SciEng | QL, SE, SL, VL.—Savageau

**118. Microelectromechanical Systems (4)**

Lecture—2 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: Chemistry 2A; Engineering 17. Restricted to upper division standing in College of Engineering. One restricted to upper division standing in Biomedical Engineering. Introduction to the theory and practice of micro-electromechanical systems (MEMS), including fundamentals of micro-nano-fabrication, microscale sensing and actuation, self assembly, microfluidics and lab-on-a-chip. Weekly hands-on laboratory sections are emphasized on implementation and utilization of MEMS technologies. GE credit: SciEng | SE.—S. (S.) Pan

**126. Tissue Mechanics (3)**

Lecture—2 hours; laboratory/discussion—3 hours. Prerequisite: Exercise Science 103 and/or Engineering 45 and/or consent of instructor. Structural and mechanical properties of biological tissues, includ-

ing bone, cartilage, ligaments, tendons, nerves, and skeletal muscle. (Same course as Exercise Biology 126.) GE credit: SciEng | QL, SE, SL, WE.

**140. Protein Engineering (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 2A. Introduction to protein structure and function. Modern methods for designing, producing, and characterizing novel proteins and peptides. Design strategies, computer modeling, heterologous expression, in vitro mutagenesis. Protein crystallography, spectroscopic and calorimetric methods for characterization, and other techniques. Offered in alternate years. GE credit: SciEng | QL, SE, SL, VL.—(S.) Facciotti

**141. Cell and Tissue Mechanics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Physics 9B; Engineering 6; Engineering 35. Mechanical properties that govern blood flow in the microcirculation. Concepts in blood rheology and cell and tissue viscoelasticity, biophysical aspects of cell migration, adhesion, and motility. GE credit: SciEng | QL, SE, VL.—W. (W.) Simon

**142. Principles and Practices of Biomedical Imaging (4)**

Lecture—4 hour. Prerequisite: Mathematics 22B, course 108 (may be taken concurrently). Basic physics, engineering principles, and applications of biomedical imaging techniques including x-ray imaging, computed tomography, magnetic resonance imaging, ultrasound and nuclear imaging. GE credit: SciEng | SE.—S. (S.) Cherry

**143. Biomolecular Systems Engineering: Synthetic Biology (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 2A; Mathematics 16C or Mathematics 17C or Mathematics 21C. Includes analysis, design, construction and characterization of molecular systems. Process and biological parts standardization, computer aided design, gene synthesis, directed evolution, protein engineering, issues of human practice, biological safety, security, innovation, and ethics are covered. Offered in alternate years. GE credit: SciEng | SE.—S. Facciotti

**151. Mechanics of DNA (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 2A and Mathematics 22B. Structural, mechanical and dynamic properties of DNA. Topics include DNA structures and their mechanical properties, in vivo topological constraints on DNA, mechanical and thermodynamic equilibria, DNA dynamics, and their roles in normal and pathological biological processes. GE credit: SciEng | OL, QL, SE.—Benham

**152. Molecular Control of Biosystems (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 2A, Physics 9B and Mathematics 22B. Fundamentals of molecular biomedicine covering state-of-the-art methods for quantitative understanding of gene regulation and signal transduction networks at different levels of organization in health and disease. Topics include classic genetic systems, synthetic circuits, networks disrupted in disease and cancer. GE credit: SciEng | OL, SE, —S. (S.) Saiz

**161A. Biomolecular Engineering (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 2A; Chemistry 8B. Restricted to upper division standing. Introduction to the basic concepts and techniques of biomolecular engineering such as recombinant DNA technology, protein engineering, and molecular diagnostics. Three units of credit for students who have taken course 161S. Offered in alternate years. GE credit: SciEng | QL, SE.—(F.) Tan

**161L. Biomolecular Engineering Laboratory (3)**

Laboratory—4.5 hours; lecture/discussion—1.5 hours. Prerequisite: course 161A or Biological Sciences 101. Introduction to the basic techniques in biomolecular engineering. Lectures, laboratory, and discussion sessions will cover basic techniques in DNA cloning, bacterial cell culture, gene regulation, protein expression, and data analysis. Offered irregularly. GE credit: SciEng | QL, SE, SL.

**161S. Biomolecular Engineering: Brief Course (1)**

Lecture—1 hour. Prerequisite: Biological Sciences 2A; Chemistry 8B; course 161L (may be taken concurrently). Basic concepts and techniques in biomolecular analysis, recombinant DNA technology, and protein purification and analysis. Not open for credit to students who have taken course 161A. Offered irregularly. GE credit: SciEng | QL, SE.

**162. Introduction to the Biophysics of Molecules and Cells (4)**

Lecture—4 hours. Prerequisite: C- or better in Mathematics 22B and Physics 9C. Introduction to fundamental physical mechanisms governing structure and function of bio-macromolecules. Emphasis on a quantitative understanding of the nano- to microscale biomechanics of interactions between and within individual molecules, as well as of their assemblies, in particular membranes. GE credit: SciEng | QL, SE, SL.—F. (F.) Heinrich

**163. Bioelectricity, Biomechanics, and Signaling Systems (4)**

Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: C- or better in Mathematics 22B; course 116 or Neurobiology, Physiology, and Behavior 101. Fundamentals of bioelectricity in cells, the calcium signaling system, and mechanical force generation in muscle. Combination of lecture and projects to promote learning of important concepts in hands-on projects using neurons and muscle as microcosms. GE credit: SciEng | SE, QL.—S. (S.) Chen-Izu

**167. Biomedical Fluid Mechanics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 106 (may be taken concurrently) or Engineering 103. Basic biofluid mechanics, Navier Stokes equations of motion, circulation, respiration and specialized applications including miscellaneous topics such as boundary layer flow. Not open for credit to students who have completed Mechanical Engineering 167C. GE credit: SciEng | QL, SE.—S. (S.) Tan

**173. Cell and Tissue Engineering (4)**

Lecture/discussion—4 hours. Prerequisite: grade of C- or better in courses 106 and 109. Engineering principles to direct cell and tissue behavior and formation. Cell sourcing, controlled delivery of macromolecules, transport within and around biomaterials, bioreactor design, tissue design criteria and outcomes assessment. GE credit: SciEng | OL, SE, SL, WE.—F. (F.) Leach

**189A. Topics in Biomedical Engineering; Cellular and Molecular Engineering (1-5)**

Prerequisite: consent of instructor. Topics in Biomedical Engineering; Cellular and Molecular Engineering. May be repeated if topic differs. Offered irregularly. GE credit: SciEng | SE.

**189B. Topics in Biomedical Engineering; Biomedical Imaging (1-5)**

Prerequisite: consent of instructor. Topics in Biomedical Engineering; Biomedical Imaging. May be repeated if topic differs. Offered irregularly. GE credit: SciEng | SE.

**189C. Topics in Biomedical Engineering; Biomedical Engineering (1-5)**

Prerequisite: consent of instructor. Topics in Biomedical Engineering; Biomedical Engineering. May be repeated if topic differs. Offered irregularly. GE credit: SciEng | SE.

**190A. Upper Division Seminar in Biomedical Engineering (1)**

Seminar—1 hour. Restricted to upper division standing. In depth examination of research topics in a small group setting. Question and answer session with faculty members. May be repeated for credit. (P/NP grading only.) GE credit: SE.

**192. Internship in Biomedical Engineering (1-12)**

Internship—3-36 hours. Prerequisite: consent of instructor. Restricted to upper division majors. Supervised work experience in the Biomedical Engineering field. May be repeated for credit. (P/NP grading only.) GE credit: SE.—F, W, S, Su. (F, W, S, Su.)

**198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. May be repeated up to three times for credit. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

**199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. Special study for advanced undergraduates. (P/NP grading only.) GE credit: SE.

**The Graduate Program in Biomedical Engineering**

Doctoral and master's degrees in Biomedical Engineering are offered through the interdisciplinary Graduate Group in Biomedical Engineering. Please see <http://www.bme.ucdavis.edu> and Biomedical Engineering [A Graduate Group], on page 194 of the catalog for a description of graduate education offerings, requirements, group faculty and research foci.

**Graduate****202. Cell and Molecular Biology for Engineers (4)**

Lecture/discussion—4 hours. Prerequisite: Biological Sciences 104 or Molecular and Cellular Biology 121. Preparation for research and critical review in the field of cell and molecular biology for biomedical or applied science engineers. Emphasis on biophysical and engineering concepts intrinsic to specific topics including receptor-ligand dynamics in cell signaling and function, cell motility, DNA replication and RNA processing, cellular energetics and protein sorting. Modern topics in bioinformatics and proteomics.—F. (F.) Yamada

**204. Physiology for Bioengineers (5)**

Lecture—4 hours. Prerequisite: Biological Sciences 1A or equivalent; graduate standing or consent of instructor. Basic human physiology of the nervous, muscular, cardiovascular, respiratory, and renal systems and their interactions; Emphasis on the physical and engineering principles governing these systems, including control and transport processes, fluid dynamics, and electrochemistry.—F. (F.) Benham

**209. Scientific Integrity for Biomedical Engineers (2)**

Lecture—1 hour; discussion—1 hour. Open to Biomedical Engineering majors only. Scientific integrity and ethics for biomedical engineers, with emphasis and discussion on mentoring, authorship and peer review, use of humans and animals in biomedical research, conflict of interest, intellectual property, genetic technology and scientific record keeping. (S/U grading only.)—S. (S.) Simon

**210. Introduction to Biomaterials (4)**

Lecture—4 hours. Prerequisite: Engineering 45 or consent of instructor. Mechanical and atomic properties of metallic, ceramic, and polymeric implant materials of metallic, ceramic, and polymeric implant materials; corrosion, degradation, and failure of implants; inflammation, wound and fracture healing, blood coagulation; properties of bones, joints, and blood vessels; biocompatibility of orthopaedic and cardiovascular materials.—W. (W.) Fyhrie

**211. Design of Polymeric Biomaterials and Biological Interfaces (4)**

Lecture—4 hours. Prerequisite: Engineering 45 or consent of instructor. Open to upper division undergraduates or graduate students. Design, selection and application of polymeric biomaterials. Integration of the principles of polymer science, surface science, materials science and biology. Offered in alternate years.—(W.) Revzin

**212. Biomedical Heat and Mass Transport Processes (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Mechanical Engineering 165, Biological Systems Engineering 125, Chemical Engineering 153 or the equivalent. Application of principles of heat and mass transfer to biomedical systems related to heat exchange between the biomedical system and its environment, mass transfer across cell membranes

and the design and analysis of artificial human organs. (Same course as Mechanical and Aeronautical Engineering 212.) Offered in alternate years.—W. Aldredge

**213. Principles and Applications of Biological Sensors (4)**

Lecture—4 hours. Prerequisite: Chemistry 2C. Biological sensors based on principles of electrochemical, optical and affinity detection. Methods for integration of sensing elements (e.g. enzymes) into biosensors and miniaturization of biosensors. Offered in alternate years.—F. Revzin

**214. Blood Cell Biomechanics (4)**

Lecture—4 hours. Prerequisite: Engineering 102. Mechanical properties that govern blood flow in the microcirculation and cell adhesion and motility. Constitutive equations of vascular tissue and blood. Blood rheology and viscoelasticity. Red and white blood cell mechanics. Remodeling of blood vessels in disease and engineering of blood vessels and cells. Offered in alternate years.—(F.) Simon

**215. Biomedical Fluid Mechanics and Transport Phenomena (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103 or Chemical Engineering 150B or Civil and Environmental Engineering 141. Application of fluid mechanics and transport to biomedical systems. Flow in normal physiological function and pathological conditions. Topics include circulatory and respiratory flows, effect of flow on cellular processes, transport in the arterial wall and in tumors, and tissue engineering. (Same course as Mechanical and Aeronautical Engineering 215.) Offered irregularly.

**216. Advanced Topics in Cellular Engineering (4)**

Lecture—4 hours. Prerequisite: course 214 or consent of instructor. Advanced research strategies and technologies used in the study of immune function and inflammation. Static and dynamic measurements of stress, strain, and molecular scale forces in blood and vascular cells, as well as genetic approaches to the study of disease. Offered in alternate years.—F. Simon

**217. Mechanobiology in Health and Disease (4)**

Lecture/discussion—4 hours. Prerequisite: course 106 or equivalent (e.g. Engineering 103), Biological Sciences 101 or equivalent, Neurobiology, Physiology, and Behavior 101 or equivalent. Principles by which biomechanical forces affect cell and tissue function to impact human health and disease. Emphasis on cardiovascular system: structure and function, biofluid mechanics and mechanotransduction, disease mechanisms and research methods. Cartilage, bone and other systems; current topics discussed.—S. Passerini

**218. Microsciences (4)**

Lecture/discussion—4 hours. Introduction to the theory of physical and chemical principles at the microscale. Scale effects, surface tension, microfluidic mechanics, micromechanical properties, intermolecular interactions and micro tribology. (Same course as Electrical and Computer Engineering 244B.)—F. (F.) Pan

**222. Cytoskeletal Mechanics (4)**

Lecture/discussion—4 hours. Prerequisite: course 202. Current topics in cytoskeletal mechanics including physical properties of the cytoskeleton and motor proteins, molecular force sensor and generator, cytoskeletal regulation of cell motility and adhesion. Offered in alternate years.—(F.) Yamada

**223. Multibody Dynamics (4)**

Lecture—4 hours. Prerequisite: Engineering 102. Coupled rigid-body kinematics/dynamics; reference frames; vector differentiation; configuration and motion constraints; holonomicity; generalized speeds; partial velocities; mass; inertia tensor/theorems; angular momentum; generalized forces; comparing Newton/Euler, Lagrange's, Kane's methods; computer-aided equation derivation; orientation;

Euler; Rodrigues parameters. (Same course as Mechanical and Aeronautical Engineering 223.)—W. (W.) Eke

### **225. Spatial Kinematics and Robotics (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: C Language and course 222. Spatial kinematics, screw theory, spatial mechanisms analysis and synthesis, robot kinematics and dynamics, robot workspace, path planning, robot programming, real-time architecture and software implementation. (Same course as Mechanical and Aeronautical Engineering 225.) Offered in alternate years.—W. Cheng

### **227. Research Techniques in Biomechanics (4)**

Lecture—2 hours; laboratory—4 hours; term paper/discussion—1 hour. Prerequisite: consent of instructor; Mathematics 22B; Exercise Science 115 recommended. Experimental techniques for biomechanical analysis of human movement are examined. Techniques evaluated include data acquisition and analysis by computer, force platform analysis, strength assessment, planar and three-dimensional videography, data reduction and smoothing, body segment parameter determination, electromyography, and biomechanical modeling. (Same course as Mechanical and Aeronautical Engineering 227/Exercise Science 227.)

### **228. Skeletal Muscle Mechanics: Form, Function, Adaptability (4)**

Lecture—4 hours. Prerequisite: basic background in biology, physiology, and engineering; Engineering 35 and 45, Mathematics 21D; Neurobiology, Physiology, and Behavior 101 recommended. Basic structure and function of skeletal muscle examined at the microscopic and macroscopic level. Muscle adaptation in response to aging, disease, injury, exercise, and disuse. Analytic models of muscle function are discussed. Offered in alternate years.—F. Hawkins

### **231. Musculo-Skeletal System Biomechanics (4)**

Lecture—4 hours. Prerequisite: Engineering 102. Mechanics of skeletal muscle and mechanical models of muscle, solution of the inverse dynamics problem, theoretical and experimental methods of kinematic and kinetic analysis, computation of intersegmental load and muscle forces, applications to gait analysis and sports biomechanics. (Same course as Mechanical and Aeronautical Engineering 231.)—S.

### **232. Skeletal Tissue Mechanics (3)**

Lecture—3 hours; laboratory—1 hour. Prerequisite: Engineering 104B. Overview of the mechanical properties of the various tissues in the musculoskeletal system, the relationship of these properties to anatomic and histologic structure, and the changes in these properties caused by aging and disuse. The tissues covered include bone, cartilage and synovial fluid, ligament and tendon. (Same course as Mechanical and Aeronautical Engineering 232.)—S. (S.) Fyhrie

### **233. Soft Tissue Mechanics (4)**

Lecture—4 hours. Presentation of structure and function of musculoskeletal soft tissues: cartilage, tendon, ligament, meniscus, and intervertebral disc. Instruction in engineering principals governing the mechanical behavior of these tissues: viscoelasticity, quasilinear viscoelasticity, and biphasic theory. Offered in alternate years.—W. Christiansen

### **239. Advanced Finite Elements and Optimization (4)**

Lecture—4 hours. Prerequisite: Engineering 180 or Applied Science 115 or Mathematics 128C. Introduction to advanced finite elements and design optimization methods, with application to modeling of complex mechanical, aerospace and biomedical systems. Application of states of the art in finite elements in optimum design of components under realistic loading conditions and constraints. (Same course as Mechanical Engineering 239.) Offered in alternate years.—(W.) Sarigul-Klijn

### **240. Computational Methods in Nonlinear Mechanics (4)**

Lecture—4 hours. Prerequisite: Applied Science Engineering 115 or Mathematics 128B or Engineering 180. Deformation of solids and the motion of fluids treated with state-of-the-art computational methods. Numerical treatment of nonlinear dynamics; classification of coupled problems; applications of finite element methods to mechanical, aeronautical, and biological systems. (Same course as Mechanical and Aeronautical Engineering 240.) Offered in alternate years.—(W.) Sarigul-Klijn

### **241. Introduction to Magnetic Resonance Imaging (3)**

Lecture—3 hours. Prerequisite: Physics 9D, Mathematics 22B. Equipment, methods, medical applications of MRI. Lectures review basic, advanced pulse sequences, image reconstruction, display and technology and how these are applied clinically. Lecture complements a more technical course. (course 246 can be taken concurrently)—F. (F.)

### **242. Introduction to Biomedical Imaging (4)**

Lecture—4 hours. Prerequisite: Physics 9D and Electrical and Computer Engineering 106 or consent of instructor. Basic physics and engineering principles of image science. Emphasis on ionizing and nonionizing radiation production and interactions with the body and detectors. Major imaging systems: radiography, computed tomography, magnetic resonance, ultrasound, and optical microscopy.—F. (F.) Chaudhari

### **243. Radiation Detectors for Biomedical Applications (4)**

Lecture/discussion—4 hours. Prerequisite: Physics 9D, Mathematics 21D, 22B. Radiation detectors and sensors used for biomedical applications. Emphasis on radiation interactions, detection, measurement and use of radiation sensors for imaging. Operating principles of gas, semiconductor, and scintillation detectors.—W. (W.) Cherry

### **246. Magnetic Resonance Technology (3)**

Lecture—3 hours. Prerequisite: Physics 9D, Mathematics 22B. Course covers MRI technology at an advanced level with emphasis on mathematical descriptions and problem solving. Topics include spin dynamics, signal generation, image reconstruction, pulse sequences, biophysical basis of T1, T2, RF, gradient coil design, signal to noise, image artifacts.—F.

### **251. Medical Image Analysis (4)**

Lecture—4 hours. Prerequisite: Electrical and Computer Engineering 106. Techniques for assessing the performance of medical imaging systems. Principles of digital image formation and processing. Measurements that summarize diagnostic image quality and the performance of human observers viewing those images. Definition of ideal observer and other mathematical observers that may be used to predict performance from system design features. Offered in alternate years.—W. Qi

### **252. Computational Methods in Biomedical Imaging (4)**

Lecture—4 hours. Prerequisite: course 105 or Statistics 120; course 108 or Electrical and Computer Engineering 150A. Analytic tomographic reconstruction from projections in 2D and 3D; model-based image reconstruction methods; maximum likelihood and Bayesian methods; applications to CT, PET, and SPECT. (Same course as Electrical and Computer Engineering 205.) Offered in alternate years.—W. Qi

### **255. Biophotonics in Medicine and the Life Sciences (3)**

Lecture/discussion—3 hours. Prerequisite: Physics 108 and Biology 101-105; course 202 highly recommended; graduate standing. Introduction to the science and technology of biomedical optics and photonics, with an overview of applications in medicine and the life sciences. Emphasis on research supported by the NSF Center for Biophotonics at UC Davis Medical Center. (Same course as Applied Science 255 and Biophysics 255.) Offered in alternate years.—S. (S.) Chuang

### **257. Fundamentals of Tissue Optics and Biomedical Applications (5)**

Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Fundamentals of optical properties of tissue. Range of optical technologies and their applications to tissue characterization and diagnostics.—S. (S.) Marcu, Wachsmann-Hogiu

### **262. Cell and Molecular Biophysics for Bioengineers (4)**

Lecture—4 hours. Prerequisite: course 284 or equivalent; graduate standing; undergraduate students by consent of instructor. Introduction to fundamental mechanisms governing the structure, function, and assembly of bio-macromolecules. Emphasis is on a quantitative understanding of the nano-to-microscale interactions between and within individual molecules, as well as of their assemblies, in particular membranes. Not open for credit to students who have completed course 162.—W. (W.) Heinrich

### **270. Biochemical Systems Theory (4)**

Lecture—4 hours. Prerequisite: course 202 concurrently or consent of instructor. Systems biology at the biochemical level. Mathematical and computational methods emphasizing nonlinear representation, dynamics, robustness, and optimization. Case studies of signal-transduction cascades, metabolic networks and regulatory mechanisms. Focus on formulating and answering fundamental questions concerning network function, design, and evolution.—F. Savageau

### **271. Gene Circuit Theory (4)**

Lecture—4 hours. Prerequisite: course 270 or 202 and consent of instructor. Analysis, design, and construction of gene circuits. Modeling strategies, elements of design, and methods for studying variations in design. Case studies involving prokaryotic gene circuits to illustrate natural selection, discovery of design principles, and construction of circuits for engineering objectives.—W. (W.) Savageau

### **272. Tissue Engineering (3)**

Lecture/discussion—3 hours. Prerequisite: Biological Sciences 104 or Molecular and Cellular Biology 121. Based on morphogenetic signals, responding stem cells and extracellular matrix scaffolding. Design and development of tissues for functional restoration of various organs damaged/lost due to cancer, disease and trauma. Fundamentals of morphogenetic signals, responding stem cells and extracellular matrix scaffolding.—W. (W.) Reddi

### **273. Integrative Tissue Engineering and Technologies (4)**

Lecture/discussion—4 hours. Prerequisite: courses 202 and 204 or similar; strongly encourage completion of course 272 although not a prerequisite. Restricted to graduate standing. Engineering principles to direct cell and tissue behavior and formation. Contents include controlled delivery of macromolecules, transport within and around biomaterials, examination of mechanical forces of engineered constructs, and current experimental techniques used in the field.—S. (S.) Leach

### **281. Acquisition and Analysis of Biomedical Signals (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 100; Statistics 130A. Restricted to upper division engineering. Basic concepts of digital signal recording and analysis; sampling; empirical modeling; Fourier analysis, random processes, spectral analysis, and correlation applied to biomedical signals.—S. (S.) Srinivasan

### **284. Mathematical Methods for Biomedical Engineers (4)**

Lecture/discussion—4 hours. Prerequisite: Mathematics 22B, Statistics 130A, or consent of instructor; upper division biomedical engineering majors, and graduate students in sciences and engineering; priority given to Biomedical Engineering graduate students. Theoretical applications of linear systems, ordinary and partial differential equations, and probability theory and random processes that describe biological systems and instruments that measure them. Students will be introduced to numerical solution techniques in MATLAB.—W. (W.) Duan

**286. Nuclear Imaging in Medicine and Biology (4)**

Lecture/discussion—4 hours. Prerequisite: course 243 or consent of instructor. Radioactive decay, interaction of radiation with matter, radionuclide production, radiation detection, digital autoradiography, gamma camera imaging, single photon emission computed tomography, positron emission tomography and applications of these techniques in biology and medicine. Offered in alternate years.—S. Cherry

**287. Concepts in Molecular Imaging (4)**

Lecture—2 hours; lecture/discussion—2 hours; term paper. Prerequisite: Chemistry 2C, Mathematics 21C, Physics 9D, consent of instructor. Current techniques and tools for molecular imaging. Emphasis on learning to apply principles from the physical sciences to imaging problems in medicine and biology.—S. Sutcliffe

**289A. Selected Topics in Biomedical Engineering; Cellular and Molecular Systems Engineering (1-5)**

Variable. Prerequisite: consent of instructor. Selected topics in Cellular and Molecular Systems Engineering. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289B. Selected Topics in Biomedical Engineering; Biomedical Imaging (1-5)**

Variable. Prerequisite: consent of instructor. Selected topics in Biomedical Imaging. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289C. Selected Topics in Biomedical Engineering; Computational Bioengineering (1-5)**

Variable. Prerequisite: consent of instructor. Selected topics in Computational Bioengineering. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289D. Selected Topics in Biomedical Engineering; Cell and Tissue Biomechanics (1-5)**

Variable. Prerequisite: consent of instructor. Selected topics in Cell and Tissue Biomechanics. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289E. Selected Topics in Biomedical Engineering; Analysis of Human Movement (1-5)**

Variable. Prerequisite: consent of instructor. Selected topics in Analysis of Human Movement. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**290. Seminar (1)**

Seminar—1 hour. Seminar in biomedical engineering. (S/U grading only.)

**290C. Graduate Research Conference (1)**

Discussion—1 hour. Prerequisite: consent of instructor. Individual and/or group conference on problems, progress, and techniques in biomedical engineering research. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**298. Directed Group Study (1-5)**

Open to graduate students in the Biomedical Engineering Graduate Group, or consent of instructor. Directed group study in Biomedical Engineering. (S/U grading only.)—F, W, S. (F, W, S.)

**299. Research (1-12)**

(S/U grading only.)

**Professional****396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

# Engineering: Chemical Engineering

(College of Engineering)

Roland Faller, Ph.D., Chairperson of the Department  
530-752-6496; Fax 530-752-1031

**Department Office.** 3001 Ghausi Hall  
530-752-0400; Fax 530-752-1031;  
<http://chms.engineering.ucdavis.edu>

**Faculty**

David E. Block, Ph.D., Professor and Endowed Chair  
(*Chemical Engineering; Viticulture and Enology*)

*Academic Senate Distinguished Teaching Award*

Roger B. Boulton, Ph.D., Professor and Endowed Chair  
(*Chemical Engineering; Viticulture and Enology*)

Stephanie R. Dungan, Ph.D., Professor (*Chemical Engineering; Food Science and Technology*)

Nael El-Farra, Ph.D., Professor  
*Academic Senate Distinguished Teaching Award*

Roland Faller, Ph.D., Professor

Bruce C. Gates, Ph.D., Distinguished Professor

Tonya L. Kuhl, Ph.D., Professor

*Academic Senate Distinguished Teaching Award*

Marjorie L. Longo, Ph.D., Professor

Karen A. McDonald, Ph.D., Professor

Greg Miller, Ph.D., Professor

Adam Moulé, Ph.D., Associate Professor

Alexandra Navrotsky, Ph.D., Distinguished Professor and Endowed Chair (*Chemical Engineering; Materials Science and Engineering; Chemistry; Land, Air and Water Resources*)

Ahmet Palazoglu, Ph.D., Professor

Ronald J. Phillips, Ph.D., Professor

Robert L. Powell, Ph.D., Professor

William Ristenpart, Ph.D., Associate Professor

Ron Runnebaum, Ph.D., Assistant Professor

(*Chemical Engineering; Viticulture and Enology*)

Spyros Tseregounis, Ph.D., Lecturer (*Chemical Engineering; Mechanical and Aerospace Engineering*)

Jason White, Ph.D., Lecturer

**Emeriti Faculty**

Brian G. Higgins, Ph.D., Professor Emeritus

Alan P. Jackman, Ph.D., Professor Emeritus

Benjamin J. McCoy, Ph.D., Professor Emeritus

Dewey D.Y. Ryu, Ph.D., Professor Emeritus

Pieter Stroeven, Ph.D., Distinguished Professor

*Academic Senate Distinguished Teaching Award*

Stephen Whitaker, Ph.D., Professor Emeritus

*Academic Senate Distinguished Teaching Award*

**Affiliated Faculty**

Lucas Arzola, Ph.D., Assistant Adjunct Professor

Cong-Yan Cheng, Ph.D., Adjunct Professor

The Department of Chemical Engineering offers two undergraduate programs: Chemical Engineering and Biochemical Engineering.

**Mission Statement.** To advance, through teaching and research programs, the frontiers of chemical and biochemical engineering; to educate students with a sense of professionalism and community; and to serve the public of California through outreach efforts.

**Honors Program.** An Honors Program is available to qualified students in the Chemical Engineering, Biochemical Engineering, and Materials Science and Engineering majors. It is a four-year program designed to challenge the most talented students in these majors. Students invited to participate will take a one-unit honors seminar in their freshman year and will enroll in various one-unit honors courses. In the upper division, students will complete either an honors thesis or a project that might involve local industry (Chemical engineering 194 HA, HB, HC). Students must maintain a grade point average of 3.500 to continue in the program. Successful completion of the Honors Program will be acknowledged on the student's transcript.

**Chemical Engineering Undergraduate Program**

The Chemical Engineering program is accredited by the Engineering Accreditation Commission of ABET; see <http://www.abet.org>.

Chemical engineers apply the principles of chemistry and engineering to produce useful commodities, ranging from fuels to polymers. Chemical engineers are increasingly concerned with chemical and engineering processes related to the environment and food production. They work in diverse areas ranging from integrated circuits to integrated waste management. Preparation for a career in chemical engineering requires an understanding of both engineering and chemical principles to develop proficiency in conceiving, designing, and operating new processes.

The chemical engineering curriculum has been planned to provide a sound knowledge of engineering and chemical sciences so that you may achieve competence in addressing current and future technical problems.

**Objectives.** The objectives of the program in Chemical Engineering are to educate students in the fundamentals of chemical engineering, balanced with the application of these principles to practical problems; to train them as independent, critical thinkers who can also function effectively in teams; to foster a sense of community, ethical responsibility, and professionalism; to prepare them for careers in industry, government, and academia; to illustrate the necessity for continuing education and self-learning; and to help students to learn to communicate proficiently in written and oral form.

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

Exclusive of General Education units, the minimum number of units required for the Chemical Engineering major is 156.

**Lower Division Required Courses**

## UNITS

Mathematics 21A-21B-21C-21D .....	16
Mathematics 22A-22B .....	6
Physics 9A-9B-9C .....	15
Chemistry 2A, 2B, 2C or Chemistry 2AH, 2BH, 2CH .....	15
Chemical Engineering and Materials Science 5, 6, 51, 80 .....	12
Engineering 45 or 45Y .....	4
Biotechnology 1 or Biotechnology 1Y or Biological Sciences 2A .....	4 or 5
English 3 or University Writing Program 1, 1V 1Y, or Comparative Literature 1, 2, 3, 4, or 4, or Native American Studies 5 (grade of C- or better is required) .....	4

**Upper Division Required Courses**

Chemical Engineering 140, 141, 142, 143, 145A, 145B, 148A, 148B, 152A, 152B, 155, 157, 158A, 158B, 158C .....	56
Chemistry 110A, 110B, 128A, 128B, 129A .....	16
Chemical Engineering and Materials Science Electives .....	8

Choose any upper division courses in the areas of Chemistry (CHE), Chemical Engineering (ECH) or Materials Science and Engineering (EMS). You may receive elective credit up to a maximum of four units for any combination of engineering courses numbered 190C, 192, 198, and 199. Courses may also be selected from the following: Biological Sciences 102; Food Science and Technology 100A, 102A, 102B; Fiber and Polymer Science 150.

**Upper Division Composition Requirement**

..... 0 or 4  
One course from the following (grade of C- or better is required): University Writing Program 102E, 102F, 104A, 104E, 104T

or passing the Upper Division Composition Exam.

### Options for Junior and Senior Years

The focus in your junior year is on fundamentals, such as thermodynamics, fluid mechanics, energy transfer, and mass transfer phenomena. In the senior year, you draw together these fundamentals and apply them in a study of kinetics, process design, and process dynamics and control. The program includes eight units of chemical engineering and materials science electives that allow you to strengthen specific areas in chemical engineering, explore new areas, or pursue new areas of specialization.

### Biochemical Engineering Undergraduate Program

The Biochemical Engineering program is accredited by the Engineering Accreditation Commission of ABET; see <http://www.abet.org>.

As the biotechnology industry expands and matures, there is increasing need for engineers who can move products from the research stage to large-scale manufacturing. As they fill this need, engineers must also understand the production, purification, and regulatory issues surrounding biopharmaceutical manufacturing.

Biochemical engineers—with their strong foundations in chemistry, biological sciences, and chemical process engineering—are in a unique position to tackle these problems. Biochemical engineers apply the principles of cell and molecular biology, biochemistry, and engineering to develop, design, scale up, optimize, and operate processes that use living cells, organisms, or biological molecules for the production and purification of products (such as monoclonal antibodies, vaccines, therapeutic proteins, antibiotics, and industrial enzymes); for health and/or environmental monitoring (such as diagnostic kits, microarrays, biosensors); or for environmental improvement (such as bioremediation). An understanding of biological processes is also becoming increasingly important in the industries that traditionally employ chemical engineers, including the industries that process materials, chemicals, foods, energy, fuels, and semiconductors.

**Objectives.** We educate students in the fundamentals of chemical and biochemical engineering, balanced with the application of these principles to practical problems; educate students as independent, critical thinkers who can also function effectively in a team; prepare students with a sense of community, ethical responsibility, and professionalism; prepare students for careers in industry, government, and academia; teach students the necessity for continuing education and self learning; and foster proficiency in written and oral communications.

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

Exclusive of General Education units, the minimum number of units required for the Biochemical Engineering major is 162.

### Lower Division Required Courses

	UNITS
Mathematics 21A-21B-21C-21D	16
Mathematics 22A-22B	6
Physics 9A-9B-9C	15
Chemistry 2A, 2B, 2C or Chemistry 2AH, 2BH, 2CH	15
Biological Sciences 2A	5
Chemical Engineering and Materials Science 5, 6, 51, 80	12
English 3 or University Writing Program 1, 1V or 1Y, or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5 (grade of C- or better is required)	4

### Upper Division Required Courses

Chemical Engineering 140, 141, 142, 143, 145A, 145B, 148A, 152A, 152B,

157, 158A, 158C, 161A, 161B, 161C, 161L ..... 60  
 Biological Sciences 102 ..... 3  
 Microbiology 102, 103L ..... 5  
 Chemistry 110A, 128A, 128B, 129A ..... 12  
 Biochemical Engineering electives ..... 9  
 Choose at least one laboratory course from the Laboratory Elective list; additional courses may be chosen from either list. You may receive biochemical engineering elective credit up to a maximum of two units of an internship (192) or independent study (199), or Biotechnology 189L with the approval of a petition, provided that the course is a laboratory-based experimental project, related to the biological and/or biochemical engineering sciences, and you submit a written report that demonstrates proficiency in laboratory skills, techniques, or method. Research does not replace the required lab elective.

*Laboratory elective list:* Biomedical Engineering 161L; Biotechnology 161A, 161B; Food Science and Technology 102B, 104L, 123L; Molecular and Cellular Biology 120L, 160L; Neurobiology, Physiology, and Behavior 101L, 104L; Viticulture and Enology 123L, 124L.  
*Lecture elective list:* Biological Sciences 2B, 2C, 101, 103, 104; Biological Systems Engineering 165; Biomedical Engineering 102, 107, 109, 117, 140, 161A, 162; Biotechnology 160, 188; Chemical Engineering 144, 166, 170; Chemistry 130A, 130B; Food Science and Technology 102A, 104, 123; Microbiology 140, 150; Molecular and Cellular Biology 123; Neurobiology, Physiology, and Behavior 101, 107; Plant Biology 112; Plant Sciences 100A, 152; Statistics 120, 130A, 131A.; Viticulture and Enology 123, 124

Upper Division Composition

Requirement ..... 0 or 4  
 One course from the following (grade of C- or better is required): University Writing Program 102E, 102F, 104A, 104E, 104T or passing the Upper Division Composition Exam.

### Graduate Program in the Department of Chemical Engineering

The Department of Chemical Engineering is home to a top-20 ranked graduate program in Chemical Engineering. We offer a unique environment for graduate studies, we are large enough to boast world-renowned faculty and state-of-the-art research facilities, yet small enough to give every graduate student personal attention.

### The Graduate Program in Chemical Engineering

M.S. and Ph.D.

Ph.D. designated emphases are available as specializations in biotechnology, biophysics, and nuclear science.

<http://chms.engineering.ucdavis.edu>  
 530-752-7952

The Chemical Engineering Graduate Program provides students with a strong grounding in the fundamentals and explores critical applications in a wide range of process systems.

Doctoral students are typically offered competitive 4-year financial offers of fellowships and research/teaching assistantships which include tuition, fees, and a stipend. Financial offers are subject to satisfactory progress towards completion of degree requirements.

Research areas include biochemistry, biomaterials, biotechnology, biomedical engineering, catalysis, colloids and surface science, electrochemical properties and devices, fluid mechanics and rheology,

green engineering and design, interfaces, mathematical modeling, molecular modeling, nanotechnology, polymers, process control, reaction engineering, renewable energy, thermochemistry, thin films, and transport phenomena.

### Courses in Engineering: Chemical and Materials Science (ECM)

Courses in Chemical and Materials Science Engineering (ECM) are listed below; courses in Chemical Engineering (ECH) follow. For Materials Science and Engineering (EMS) courses, see *Engineering: Materials Science and Engineering*, on page 304.

#### 1. Design of Coffee—An Introduction to Chemical Engineering (3)

Lecture—1 hour; laboratory—2 hours; project—1 hour. Non-mathematical introduction to how chemical engineers think, illustrated by elucidation of the process of roasting and brewing coffee. Qualitative overview of the basic principles of engineering analysis and design. Corresponding experiments testing design choices on the sensory qualities of coffee. Not open for credit to Chemical Engineering and Biochemical Engineering majors or students who have completed Chemical and Materials Science 5. GE credit: SciEng | SE, SL, VL.—F, W, S. (F, W, S.)

#### 5. Analysis in Biochemical, Chemical and Materials Engineering (3)

Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 21A and 21B (concurrently). Analysis of systems of interest to chemical engineers and materials scientists. Applications of differential and integral calculus. Dimensional analysis. GE credit: SciEng | QL, SE, —W. (W.)

#### 6. Computational Methods for Bio/Chemical/Materials Engineers (4)

Lecture/discussion—4 hours. Prerequisite: Mathematics 21C. Programming methods for solving problems in chemical, biochemical and materials engineering using MATLAB. Programming styles, data structures, working with lists, functions and rules. Applications drawn from material balances, statistics, numerical methods, and bioinformatics. GE credit: SciEng | QL, SE, —S. (S.)

#### 90X. Honors Discussion Section (1)

Discussion—1 hour. Prerequisite: open only to students enrolled in the Chemical Engineering or Biochemical Engineering Honors programs.

Examination of special topics covered in selected lower-division courses through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. May be repeated for credit when topic differs. Offered irregularly.—W, S. (W, S.)

#### 94H. Honors Seminar (1)

Seminar—1 hour. Prerequisite: open only to students enrolled in the Chemical Engineering or Biochemical Engineering Honors programs. Examination of selected current topics in chemical or biochemical engineering through readings, discussions, collaborative work or special activities which may include projects, laboratory experiences or computer simulations. Offered irregularly.—F. (F.)

### Upper Division

#### 189A. Special Topics in ECM; Fluid Mechanics (1-5)

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics; Fluid Mechanics. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE, —F, W, S. (F, W, S.)

#### 189B. Special Topics in ECM; Nonlinear Analysis and Numerical Methods (1-5)

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics; Nonlinear Analysis and Numerical Methods. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE, —F, W, S. (F, W, S.)

**189C. Special Topics in ECM; Process Control (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics; Process Control. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189D. Special Topics in ECM; Chemistry of Catalytic Processes (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics; Chemistry of Catalytic Processes. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189E. Special Topics in ECM; Biotechnology (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics; Biotechnology. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189F. Special Topics in ECM; Interfacial Engineering (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics; Interfacial Engineering. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189G. Special Topics in ECM; Thermodynamics (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics; Thermodynamics. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189H. Special Topics in ECM; Membrane Separations (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics; Membrane Separations. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189I. Special Topics in ECM; Novel Experimental Methods (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics; Novel Experimental Methods. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189J. Special Topics in ECM; Transport Phenomena (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics; Transport Phenomena. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189K. Special Topics in ECM; Biomolecular Engineering (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics; Biomolecular Engineering. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189L. Special Topics in ECM; Electronic Materials (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics; Electronic Materials. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189M. Special Topics in ECM; Ceramics and Minerals (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics; Ceramics and Minerals. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189N. Special Topics in ECM; Physics and Chemistry of Materials (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics; Physics and Chemistry of Materials. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189O. Special Topics in ECM; Materials Processing (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics; Materials Processing. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189P. Special Topics in ECM; Materials Science and Forensics (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics; Materials Science and Forensics. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189Q. Special Topics in ECM; Biomaterials (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics; Biomaterials. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189R. Special Topics in ECM; Surface Chemistry of Metal Oxides (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics; Surface Chemistry of Metal Oxides. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**190X. Honors Discussion Section (1)**

Discussion—1 hour. Prerequisite: open only to students enrolled in the Chemical Engineering or Biochemical Engineering Honors programs.

Examination of special topics covered in selected upper division courses through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. May be repeated for credit when topic differs. Offered irregularly.—F, W, S. (F, W, S.)

**194HA. Special Study for Honors Students (2)**

Independent study—6 hours. Open only to students enrolled in the Chemical Engineering or Biochemical Engineering Honors programs. Guided independent study of a selected topic in Chemical Engineering or Biochemical Engineering. Preparation for course 194HB. Offered irregularly. GE credit:

SciEng | SE.—F, W, S. (F, W, S.)

**194HB. Special Study for Honors Students (1-5)**

Independent study—3 hours. Prerequisite: course 194HA. Open only to students enrolled in the Chemical Engineering or Biochemical Engineering Honors programs. Guided independent study of a selected topic in Chemical Engineering or Biochemical Engineering. Preparation for course 194HC. May be repeated for credit. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**194HC. Special Study for Honors Students (1-5)**

Prerequisite: course 194HB. Open only to students enrolled in the Chemical Engineering or Biochemical Engineering Honors programs. Guided independent study of a selected topic in Chemical Engineering or Biochemical Engineering leading to the presentation of an honors project or thesis, under the supervision of a faculty adviser. Offered irregularly. GE credit: SciEng | QL, SE.—F, W, S. (F, W, S.)

**Graduate****229. Computational Molecular Modeling (4)**

Lecture—3 hours; project—1 hour. Prerequisite: familiar with basic programming in either Fortran or C; prior experience with numerical methods and analysis; consent of instructor. Theory and hands-on implementation of algorithms in computational statistical mechanics. Temporal integrators, molecular dynamics, ab-initio methods, force fields, constrained dynamics, Monte Carlo techniques, fluctuation-dissipation theorem, and parallel vs. serial computing. Offered irregularly.—S. (S.)

**261. Molecular Modelling of Soft and Biological Matter (4)**

Lecture/discussion—4 hours. Prerequisite: Materials Science and Engineering 247 or Engineering: Chemical 252 or equivalent course in advanced thermodynamics/statistical mechanics. Modern molecular simulation techniques with a focus on soft matter like polymers, biologically relevant systems, and glasses. Offered irregularly.—W. (W.) Faller

**268. Process Monitoring and Data Analysis (3)**

Lecture—3 hours. Prerequisite: senior or graduate standing in engineering or physical sciences or consent of instructor. Analytical approaches to the proper management of experimental and process system data, ranging from univariate and multivariate statistical methods to neural networks, wavelets and Markov models. Offered irregularly.—S. (S.)

**280. Seminar in Ethics for Scientists (2)**

Seminar—2 hours. Restricted to 20 students; graduate standing in any department of science or engineering. Studies of topical and historical issues in the ethics of science, possibly including issues such as proper authorship, peer review, fraud, plagiarism, responsible collaboration, and conflict of interest. (Same course as Chemistry 280 and Physics 280.) (S/U grading only.) Offered irregularly.—S. (S.)

**281. Green Engineering: Theory and Practice (3)**

Lecture/discussion—3 hours. Prerequisite: graduate standing in Engineering or consent of instructor. Methods of evaluating alternative technologies, processes, materials, chemicals, and/or products relative to pollution, waste, toxic substance use, and sustainability. Topics include environmental regulations, recycling, life-cycle assessment, economic analysis, design for the environment, green chemistry and toxicology. Offered irregularly.—W. (W.)

**290. Chemical Engineering & Materials Science Seminar (1)**

Seminar—1 hour. Prerequisite: graduate standing or consent of instructor. Selected topics of current interest in Chemical Engineering and Materials Science Engineering. The subjects covered will vary from year to year and will be announced at the beginning of each quarter. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**Courses in Engineering: Chemical (ECH)****Lower Division****51. Material Balances (4)**

Lecture—4 hours. Prerequisite: Mathematics 21D with C- or better, and Mathematics 22A or concurrent. Application of the principle of conservation of mass to single and multicomponent systems in chemical process calculations. Studies of batch, semi-batch, and continuous processes involving mass transfer, change of phase, stoichiometry and chemical reaction. Not open for credit to students who have completed course 151. GE credit: SciEng | SE.—W. (F)

**80. Chemical Engineering Profession (1)**

Lecture/discussion—1 hours. Professional opportunities and professional responsibilities of chemical engineers. Opportunities and needs for post-baccalaureate education. Relationship of chemical engineering to contemporary issues. GE credit: SciEng or SocSci | SE or SS.—F. (F.)

**98. Directed Group Study (1-5)**

Prerequisite: consent of instructor and lower division standing. Directed group study. (P/NP grading only.) Offered irregularly. GE credit: SE.—F, W, S. (F, W, S.)

**99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) Special study for undergraduates. Offered irregularly. GE credit: SE.—F, W, S. (F, W, S.)

**Upper Division****140. Mathematical Methods in Biochemical and Chemical Engineering (4)**

Lecture/discussion—3 hours; laboratory—1 hour. Prerequisite: Mathematics 22B; and Chemical and Materials Science 6 or Engineering 6 or equivalent. Mathematical methods for solving problems in chemical and biochemical engineering, with emphasis on transport phenomena. Fourier series and separation of variables. Sturm-Liouville eigenvalue problems. Similarity transformations. Tensor analysis. Finite difference methods for solving time-dependent diffusion problems. Not open for credit to students who have completed course 159. GE credit: SciEng | SE. —F. (F.)

**141. Fluid Mechanics for Biochemical and Chemical Engineers (4)**

Lecture/discussion—4 hours. Prerequisite: course 140 and course 51 or concurrent. Principles and applications of fluid mechanics in chemical and biochemical engineering. Hydrostatics. The stress tensor and Newton's law of viscosity. Not open for credit to students who have completed course 150B. GE credit: SciEng | QL, SE. —W. (W.)

**142. Heat Transfer for Biochemical and Chemical Engineers (4)**

Lecture/discussion—4 hours. Prerequisite: course 51 with a C- or better, course 141. Conduction, convection, and radiation of thermal energy in applications to chemical and biochemical engineering. Derivation of thermal and mechanical energy equations. Thermal boundary layers. Macroscopic balances. Applications: heat transfer in tubes, channels, and integrated circuits, and analysis of heat exchangers. Not open for credit to students who have completed course 153. GE credit: SciEng | QL, SE. —S. (S.)

**143. Mass Transfer for Biochemical and Chemical Engineers (4)**

Lecture/discussion—4 hours. Prerequisite: course 51 with a C- or better, course 141. Derivation of species conservation equations describing convective and diffusive mass transfer. Fick's law and the Stefan-Maxwell constitutive equations. Mass transfer coefficients. Multicomponent mass transfer across gas/liquid interfaces. Applications include drying, heterogeneous chemical reactions, and membrane separations. GE credit: SciEng | SE. —S. (S.)

**144. Rheology and Polymer Processing (3)**

Lecture/Discussion—3 hours. Prerequisite: course 141. Deformation in steady shear, unsteady shear, and elongational flows. Linear and non-linear viscoelastic constitutive models. The principle of material indifference and admissibility of constitutive equations. Introduction to the unit operations of polymer processing. Not open for credit to students who have completed course 150C. Offered irregularly. GE credit: SciEng | SE. —S. (S.)

**145A. Chemical Engineering Thermodynamics Laboratory (3)**

Laboratory—2 hours; discussion—1 hour; extensive writing. Prerequisite: course 152A, course 152B (may be taken concurrently). Open to majors in Chemical Engineering, Chemical Engineering/Materials Science, & Biochemical Engineering. Laboratory experiments in chemical engineering thermodynamics. GE credit: SciEng | SE, WE. —W. (W.)

**145B. Chemical Engineering Transport Lab (3)**

Laboratory—2 hours; discussion—1 hour; extensive writing. Prerequisite: courses 141 and 145A. Open to majors in Chemical Engineering, Chemical Engineering/Materials Science, & Biochemical Engineering. Laboratory experiments in chemical engineering transport phenomena. GE credit: SciEng | SE, WE. —S. (S.)

**148A. Chemical Kinetics and Reaction Engineering (3)**

Lecture—3 hours. Prerequisite: course 143; course 152B. Ideal chemical reactors. Rate laws and stoichiometry. Design and analysis of isothermal reac-

tors with multiple reactions. Not open for credit to students who have taken course 146. GE credit: SciEng | SE. —F. (F.)

**148B. Chemical Kinetics and Reaction Engineering (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 148A. Design and analysis of non-isothermal reactors. Reactions in packed beds with pressure drop. Adsorption and heterogeneous catalysis. Transport limitations. Not open for credit to students who have taken course 146. GE credit: SciEng | SE. —W. (W.)

**152A. Chemical Engineering Thermodynamics (3)**

Lecture—3 hours. Prerequisite: Chemical and Materials Science Engineering 6 or concurrent enrollment. Application of principles of thermodynamics to chemical processes. Not open for credit to students who have completed Engineering 105 or 105A. GE credit: SciEng | SE. —F. (F.)

**152B. Chemical Engineering Thermodynamics (4)**

Lecture/discussion—4 hour. Prerequisite: course 152A. Continuation of course 152A. Not open for credit to students who have completed Engineering 105. GE credit: SciEng | SE. —W. (W.)

**155. Chemical Engineering Kinetics and Reactor Design Laboratory (4)**

Laboratory—6 hours; discussion—1 hour; term paper. Prerequisite: courses 145B, 148A; (course 148B and 157) may be taken concurrently; satisfaction of the upper division English composition requirement. Open to majors in Chemical Engineering, Chemical Engineering/Materials Science, and Biochemical Engineering. Laboratory experiments in chemical kinetics, reactor design and process control. Not open for credit to students who have taken course 155B. GE credit: SciEng | SE, OL, VL, WE. —W, S. (W, S.)

**155A. Chemical Engineering Laboratory (4)**

Laboratory—6 hours; discussion—1 hour; term paper. Prerequisite: courses 141, 142, and 143 (may be taken concurrently); satisfaction of the upper division English composition requirement. Open only to majors in Chemical Engineering, Chemical Engineering/Materials Science, Biochemical Engineering, Biomedical Engineering, and Biological Systems Engineering. Laboratory experiments in transport phenomena, chemical kinetics, and thermodynamics. GE credit: SciEng | Wrt | OL, QL, SE, VL, WE.

**155B. Chemical Engineering Laboratory (4)**

Laboratory—6 hours; discussion—1 hour; extensive writing—1 hour. Prerequisite: courses 143 (may be taken concurrently), 155A; satisfaction of the upper division English composition requirement. Open only to majors in Chemical Engineering, Chemical Engineering/Materials Science, Biochemical Engineering, Biomedical Engineering, Food Engineering, and Biosystems Engineering. Continuation of course 155A. Laboratory experiments in transport phenomena, chemical kinetics, and thermodynamics. GE credit: SciEng, Wrt | QL, SE, VL, WE.

**157. Process Dynamics and Control (4)**

Lecture/discussion—4 hours. Prerequisite: course 140. Fundamentals of dynamics and modeling of chemical processes. Design and analysis of feedback control of chemical processes. GE credit: SciEng | QL, SE. —F. (F.)

**158A. Process Economics and Green Design (4)**

Lecture/discussion—4 hours. Prerequisite: courses 142; 143. Senior design experience in process and product creation and design with multiple realistic constraints. Cost accounting and capital investment estimation. Profitability analysis techniques. Green chemistry, health risk assessment and life cycle assessment concepts. GE credit: SciEng or SocSci | SE or SS, SL, VL, WE. —F. (F.)

**158B. Separations and Unit Operations (4)**

Lecture—4 hours. Prerequisite: course 158A. Senior design experience with multiple realistic constraints. Heuristic and rigorous design of chemical process equipment. Separation by filtration, distillation and extraction. Synthesis of reactor and separation networks, heat and power integration. GE credit: SciEng | QL, SE. —W. (W.)

**158C. Plant Design Project (4)**

Laboratory/discussion—2 hours; project—2 hours. Prerequisite: course 158B or 161C. Senior design experience for chemical and biochemical processes. Impact of multiple realistic constraints. Design, costing and profitability analysis of complete plants. Use of computer-aided design techniques. GE credit: SciEng | OL, QL, SE, SL, VL, WE. —S. (S.)

**160. Fundamentals of Biomanufacturing (3)**

Lecture—3 hours. Prerequisite: Microbiology 102, Biological Sciences 102 or Animal Biology 102. Principles of large scale bioreactor production of metabolites, enzymes, and recombinant proteins including the development of strains/cell lines, fermentor/bioreactor design, monitoring and operation, product recovery and purification, and biomanufacturing economics. Not open for credit to students who have completed course 161C or both 161A and 161B; only two units of credit to students who have completed either course 161A or 161B. Offered irregularly. GE credit: SciEng | QL, SE, VL.

**161A. Biochemical Engineering Fundamentals (4)**

Lecture/discussion—4 hours. Prerequisite: course 148A. Biokinetics; bioreactor design and operation; transport phenomena in bioreactors; microbial, plant, and animal cell cultures. GE credit: SciEng | QL, SE, VL. —W. (W.)

**161B. Bioseparations (4)**

Lecture/discussion—4 hours. Prerequisite: course 143. Product recovery and purification of biochemicals. Cell disruption, centrifugation, filtration, membrane separations, extraction, and chromatographic separation. GE credit: SciEng | QL, SE. —W. (W.)

**161C. Biotechnology Facility Design and Regulatory Compliance (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 161A (co-requisite) and course 161B (co-requisite), or Molecular & Cellular Biology 263 (co-requisite). Design of biotechnology manufacturing facilities. Fermentation and purification equipment, and utility systems. Introduction to current good manufacturing practices, regulatory compliance, and documentation. GE credit: SciEng or SocSci | QL, SE or SS, SL, VL. —W. (W.)

**161L. Bioprocess Engineering Laboratory (4)**

Laboratory—9 hours; discussion—1 hour; term paper. Prerequisite: course 161A and 161B, or Viticulture and Enology 186, or Biological Sciences 103 and Molecular and Cellular Biology 120L. Pass One restricted to chemical/biochemical engineering majors. Laboratory experiments in the operation and analysis of bioreactors; determination of oxygen mass transfer coefficients in bioreactors and ion exchange chromatography. GE credit: SciEng, Wrt | QL, SE, VL, WE. —S. (S.)

**166. Catalysis (3)**

Lecture—3 hours. Prerequisite: course 148A; consent of instructor. Principles of catalysis based on an integration of principles of physical, organic, and inorganic chemistry and chemical kinetics and chemical reaction engineering. Catalysis in solution; catalysis by enzymes; catalysis in swellable polymers; catalysis in microscopic cages (zeolites); catalysis on surfaces. Offered irregularly. GE credit: SciEng | SE. —S. (S.)

**170. Introduction to Colloid and Surface Phenomena (3)**

Lecture—3 hours. Prerequisite: Chemistry 110A. Introduction to the behavior of surfaces and disperse systems. Fundamentals will be applied to the solution of practical problems in colloid science. Course

should be of value to engineers, chemists, biologists, soil scientists, and related disciplines. Offered irregularly. GE credit: SciEng | SE. —S. (S.)

### **190C. Research Group Conferences (1)**

Discussion—1 hour. Prerequisite: upper division standing in Chemical Engineering; consent of instructor. Research group conferences. May be repeated for credit. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

### **190X. Upper Division Seminar (1)**

Seminar—1 hour. Prerequisite: upper division standing. In-depth examination of a special topic in a small group setting. Offered irregularly.—F, W, S. (F, W, S.)

### **192. Internship in Chemical or Biochemical Engineering (1-5)**

Internship—3-15 hours. Prerequisite: completion of a minimum of 84 units; project approval before period of internship, consent of instructor. Supervised work experience in Chemical or Biochemical. May be repeated for credit when project differs. (P/NP grading only.) Offered irregularly. GE credit: SE.—F, W, S. (F, W, Su.)

### **198. Group Study (1-5)**

Prerequisite: consent of instructor. Group study. (P/NP grading only.) Offered irregularly. GE credit: SE.—F, W, S. (F, W, S.)

### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

## **Graduate**

### **206. Biochemical Engineering (3)**

Lecture—3 hours. Prerequisite: Microbiology 102 and 102L, Biological Sciences 101, 102, 103, Molecular and Cellular Biology 120L, 200A; Food Science and Technology 205 recommended; or consent of instructor. Interaction of chemical engineering, biochemistry, and microbiology. Mathematical representations of microbial systems. Kinetics of growth, death, and metabolism. Continuous fermentation, agitation, mass transfer and scale-up in fermentation systems, product recovery, enzyme technology. Offered irregularly.—W. (W.)

### **226. Enzyme Engineering (3)**

Lecture—3 hours. Prerequisite: Microbiology 102 and 102L, Biological Sciences 102, 103, Molecular and Cellular Biology 122, 120L, 200A; or consent of instructor. Application of basic biochemical and engineering principles of practical enzymatic processes. Lectures cover large scale production and separation of enzymes, immobilized enzyme systems, enzyme reactor design and optimization, and new application of enzymes in genetic engineering related biotechnology. Offered irregularly.—W. (W.)

### **245. Micro- and Nano-Technology in Life Sciences (4)**

Lecture/discussion—4 hours. Prerequisite: graduate standing or consent of instructor. Survey of biomedical device design from the engineering and biological perspectives; micro-/nano-fabrication and characterization techniques; surface chemistry and mass transfer; essential biological processes and models; proposal development skills to merge aforementioned themes in a multidisciplinary project. (Same course as Electrical and Computer Engineering 245 and Materials Science and Engineering 245.)—S. (S.) Seker

### **246. Advanced Biochemical Engineering (2)**

Lecture—2 hours. Prerequisite: course 206 or consent of instructor. Advances in the field of biotechnology including genetic engineering, enzyme engineering, fermentation science, and renewable resources development. The important results of original research will be evaluated for understanding of the fundamental principles and for potential practical application. Offered irregularly.—W. (W.)

### **252. Statistical Thermodynamics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 152B, Engineering 105B, or the equivalent. A treatment of the statistical basis of thermodynam-

ics; introduction to statistical mechanics; discussion of the laws of thermodynamics; application of thermodynamic relationships to phase and chemical reaction equilibrium; introduction to molecular simulations and the evaluation of thermodynamic properties from molecular simulations.—F. (F.)

### **253A. Advanced Fluid Mechanics (4)**

Lecture—4 hours. Prerequisite: courses 141 and 259. Kinematics and basic principles of fluid flow. Principles of constitutive equations. Navier-Stokes equations for Newtonian fluids. Survey of rectilinear creeping flow, lubrication flow and boundary layer theory.—F. (F.)

### **253B. Advanced Heat Transport (4)**

Lecture—4 hours. Prerequisite: courses 142 and 259 or the equivalent. Fundamental energy postulates and derivation of microscopic and macroscopic energy equations. Mechanisms of conduction. Isotropic, thermoelastic and anisotropic materials solution problems using Greens functions and perturbation theory.—W. (W.)

### **253C. Advanced Mass Transfer (4)**

Lecture—4 hours. Prerequisite: course 253A or the equivalent. Kinematics and basic conservation principles for multicomponent systems. Constitutive equations for momentum, heat and mass transfer, applications to binary and ternary systems. Details of diffusion with reaction, and the effects of concentration.—F. (F.)

### **254. Colloid and Surface Phenomena (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in science or engineering or consent of instructor. Thermodynamics and rate processes at interfaces. These fundamental processes will be applied to determine the collective properties of thin films and membranes, self-assembled systems, liquid crystals and colloidal systems. Experimental techniques in surface analysis.—S. (S.)

### **256. Chemical Kinetics and Reaction Engineering (4)**

Lecture—4 hours. Prerequisite: courses 146 or the equivalent. Analysis of the performance of chemical reactors and design of chemical reactors based on the principles of chemical kinetics and transport phenomena. Consideration of noncatalytic/catalytic reactions in single fluid phases and emphasis on reactions in multiphase mixtures, especially gas-solid reactors.—W. (W.)

### **259. Advanced Engineering Mathematics (4)**

Lecture—4 hours. Prerequisite: Mathematics 21D, 22A, 22B. Applications of methods of applied mathematics to the analytical and numerical solution of linear and nonlinear ordinary and partial differential equations arising in the study of transport phenomena.—F. (F.)

### **262. Transport Phenomena in Multiphase Systems (3)**

Lecture/discussion—3 hours. Prerequisite: course 253C. Heat, mass and momentum transfer in multiphase, multicomponent systems with special emphasis on transport processes in porous media. Derivation of the averaging theorem and application of the method of volume averaging to multicomponent, reacting systems. Offered irregularly.—S. (S.)

### **263. Rheology and Mechanics of Non-Newtonian Fluids (3)**

Lecture—3 hours. Prerequisite: courses 253A and 259 or consent of instructor. Mechanics of polymer solutions and suspension, especially the development of properly invariant constitutive equations. Topics include: viscometry, linear and nonlinear viscoelasticity, continuum mechanics, kinetic theory. Offered irregularly.—W. (W.) Powell

### **265. Emulsions, Microemulsions and Bilayers (3)**

Lecture—3 hours. Prerequisite: an undergraduate course in physical chemistry. Thermodynamic and mechanical descriptions of surfactant-laden interfaces. Forces between and within interfaces. Physics

of micelle and microemulsion formation. Structure and stability of emulsions. Properties of phospholipid bilayers, with emphasis on vesicles.—W. (W.)

### **267. Advanced Process Control (3)**

Lecture—3 hours. Prerequisite: course 157 or the equivalent. Advanced course in analysis and synthesis of linear multivariable systems. Emphasis on frequency domain techniques and applications to chemical processes. Topics include singular value analysis, internal model control, robust controller design methods as well as self-tuning control techniques. Offered irregularly.—S. (S.)

### **289A. Special Topics in Chemical Engineering; Fluid Mechanics (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics in Fluid Mechanics. May be repeated for credit when topic differs. Offered irregularly.—F, W, S. (F, W, S.)

### **289B. Special Topics in Chemical Engineering; Nonlinear Analysis and Numerical Methods (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics in Nonlinear Analysis and Numerical Methods. May be repeated for credit when topic differs. Offered irregularly.—F, W, S. (F, W, S.)

### **289C. Special Topics in Chemical Engineering; Process Control (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics in Process Control. May be repeated for credit when topic differs. Offered irregularly.—F, W, S. (F, W, S.)

### **289D. Special Topics in Chemical Engineering; Chemistry of Catalytic Processes (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics in Chemistry of Catalytic Processes. May be repeated for credit when topic differs. Offered irregularly.—F, W, S. (F, W, S.)

### **289E. Special Topics in Chemical Engineering; Biotechnology (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics in Biotechnology. May be repeated for credit when topic differs. Offered irregularly.—F, W, S. (F, W, S.)

### **289F. Special Topics in Chemical Engineering; Interfacial Engineering (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics in Interfacial Engineering. May be repeated for credit when topic differs. Offered irregularly.—F, W, S. (F, W, S.)

### **289G. Special Topics in Chemical Engineering; Molecular Thermodynamics (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics in Molecular Thermodynamics. May be repeated for credit when topic differs. Offered irregularly.—F, W, S. (F, W, S.)

### **289H. Special Topics in Chemical Engineering; Membrane Separations (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics in Membrane Separations. May be repeated for credit when topic differs. Offered irregularly.—F, W, S. (F, W, S.)

### **289I. Special Topics in Chemical Engineering; Advanced Materials Processing (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics in Advanced Materials Processing. May be repeated for credit when topic differs. Offered irregularly.—F, W, S. (F, W, S.)

### **289J. Special Topics in Chemical Engineering; Novel Experimental Methods (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics in Novel Experimental Methods. May be repeated for credit when topic differs. Offered irregularly.—F, W, S. (F, W, S.)

### **289K. Special Topics in Chemical Engineering; Advanced Transport Phenomena (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics in Advanced Transport Phenomena. May be repeated for credit when topic differs. Offered irregularly.—F, W, S. (F, W, S.)

### **289L. Special Topics in Chemical Engineering; Biomolecular Engineering (1-5)**

Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics in Biomolecular Engineering. May be repeated for credit when topic differs. Offered irregularly.—F, W, S. (F, W, S.)

### **290. Seminar (1)**

Seminar—1 hour. Seminar. (S/U grading only.) Offered irregularly.—F, W, S. (F, W, S.)

### **290C. Graduate Research Group Conference (1)**

Discussion—1 hour. Prerequisite: consent of instructor. Research problems, progress and techniques in chemical engineering. May be repeated for credit. (S/U grading only.) Offered irregularly.—F, W, S. (F, W, S.)

### **294. Current Progress in Biotechnology (1)**

Seminar—1 hour. Prerequisite: graduate standing. Seminars presented by guest lecturers on subjects of their own research activities. May be repeated for credit. (Same course as Molecular and Cellular Biology 294.) (S/U grading only.) Offered irregularly.—F, W, S. (F, W, S.)

### **298. Group Study (1-5)**

Prerequisite: consent of instructor. Group study. (S/U grading only.) Offered irregularly.—F, W, S. (F, W, S.)

### **299. Research (1-12)**

Research. (S/U grading only.) Offered irregularly.—F, W, S. (F, W, S.)

## **Professional**

### **390. Teaching of Chemical Engineering (1)**

Discussion—1 hour. Prerequisite: qualifications and acceptance as teaching assistant and/or associate-in in chemical engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated two times for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## **Engineering: Civil and Environmental**

(College of Engineering)

Amit M. Kanvinde, Ph.D., Chairperson of the Department 530-752-0586;

**Department Office.** 2001 Ghausi Hall  
530-752-0586; <http://cee.engr.ucdavis.edu>

## **Faculty**

John E. Bolander, Ph.D., Professor  
Fabian A. Bombardelli, Ph.D., Associate Professor  
Ross W. Boulanger, Ph.D., Professor  
Colleen E. Bronner, Ph.D., Lecturer  
Christopher D. Cappa, Ph.D., Professor  
Y. H. (Rob) Chai, Ph.D., Professor  
Lijuan Cheng, Ph.D., Associate Professor  
Yannis F. Dafalias, Ph.D., Professor  
Jeannie L. Darby, Ph.D., Professor  
*Academic Senate Distinguished Teaching Award*  
Jason T. DeJong, Ph.D., Professor  
Yueyue Fan, Ph.D., Professor  
Alexander L. Forrest, Ph.D., Assistant Professor  
John T. Harvey, Ph.D., Professor  
Jonathan D. Herman, Ph.D., Assistant Professor  
Miguel A. Jaller, Ph.D., Assistant Professor  
Boris Jeremic, Ph.D., Professor  
Amit M. Kanvinde, Ph.D., Professor  
M. Levent Kavvas, Ph.D., Professor

Alissa Kendall, Ph.D., Associate Professor

Michael J. Kleeman, Ph.D., Professor

Sashi K. Kunnath, Ph.D., Professor

Bruce L. Kutter, Ph.D., Professor

Frank J. Loge, Ph.D., Professor

Jay R. Lund, Ph.D., Professor

Sabbie A. Miller, Ph.D., Assistant Professor

Mark P. Modera, Ph.D., Professor (*Civil and Environmental Engineering; Mechanical and Aerospace Engineering*)

Debbie A. Niemeier, Ph.D., Professor

Mark M. Rashid, Ph.D., Professor

*Academic Senate Distinguished Teaching Award*

S. Geoffrey Schladow, Ph.D., Professor

Daniel Sperling, Ph.D., Professor (*Civil and Environmental Engineering; Environmental Science and Policy*)

N. Sukumar, Ph.D., Professor

Anthony S. Wexler, Ph.D., Professor (*Civil and Environmental Engineering; Mechanical and Aerospace Engineering; Land, Air and Water Resources*)

Thomas M. Young, Ph.D., Professor

Bassam A. Younis, Ph.D., Professor

H. Michael Zhang, Ph.D., Professor

## **Emeriti Faculty**

Takashi Asano, Ph.D., Professor Emeritus

Don O. Brush, Ph.D., Professor Emeritus

Daniel P. Y. Chang, Ph.D., Professor Emeritus

James A. Cheney, Ph.D., Professor Emeritus

Leonard R. Herrmann, Ph.D., Professor Emeritus

*Academic Senate Distinguished Teaching Award, UC Davis Prize for Teaching and Scholarly Achievement*

I.M. Idriss, Ph.D., Professor Emeritus

Timothy R. Ginn, Ph.D., Professor Emeritus

Ian P. King, Ph.D., Professor Emeritus

Bruce E. Larock, Ph.D., Professor Emeritus

Miguel A. Mariño, Ph.D., Professor Emeritus (*Civil and Environmental Engineering; Land, Air and Water Resources*)

Patricia L. Moktarian, Ph.D., Professor Emerita

Gerald T. Orlob, Ph.D., Professor Emeritus

Otto G. Raabe, Ph.D., Professor Emeritus

Melvin R. Ramey, Ph.D., Professor Emeritus

Karl M. Romstad, Ph.D., Professor Emeritus

*Academic Senate Distinguished Teaching Award*

Edward D. Schroeder, Ph.D., Professor Emeritus

*Academic Senate Distinguished Teaching Award*

Verne H. Scott, Ph.D., Professor Emeritus

Michael A. Taylor, Ph.D., Professor Emeritus

George Tchobanoglous, Ph.D., Professor Emeritus

Stefan Wuertz, Ph.D., Professor Emeritus

## **Affiliated Faculty**

Norman A. Abrahamson, Ph.D., Adjunct Professor

Kenneth J. Loh, Ph.D., Adjunct Associate Professor

Patrick C. Lucia, Ph.D., Adjunct Professor

Brian H. Maroney, D.Engr., Adjunct Assistant Professor

Professor

## **The Civil and Environmental Engineering Programs**

**Mission.** The Department of Civil and Environmental Engineering integrates research, education, and professional service in areas related to civil infrastructure and the environment. We provide the profession and academia with outstanding graduates who advance both engineering practice and fundamental knowledge.

**Program Educational Objectives.** The objectives of the Civil Engineering undergraduate program at the University of California, Davis are to produce civil and environmental engineers who (1) are proficient in the fundamentals of engineering science, analytical and quantitative reasoning, and design in the context of civil and environmental engineering, (2) are able to apply these skills in developing safe, sustainable, economical and environmentally sound solutions to civil engineering problems either within the profession or through post-graduate research, (3) grow professionally in their careers through continued development of technical and management skills, achievement of profes-

sional licensure, and assumption of roles of responsibility in professional service, and (4) understand the needs and represent the diversity of the program's constituencies\*, thereby serving the needs of society and the profession.

\*The constituency of the CEE program includes our students and those organizations or employers that they might join during career paths spanning professional practice, education, and research. Specifically, these constituents may include consulting firms and organizations, state and federal agencies or laboratories, universities, cities and counties, contractors, civil-product manufacturers and suppliers, and environmental organizations.

**Study Abroad and Civil Engineering.** The department offers courses in locations such as Ireland, Italy, and Japan through the Summer Abroad Program. Students may also complete a portion of the civil engineering program at an international institution, such as the University of Edinburgh, by participating in an Education Abroad Program. The department encourages interested students to participate in both Summer Abroad and Education Abroad Programs. Please consult with the undergraduate staff adviser in the department for more information. Often students are in their junior or senior year of study when they participate in this option.

## **Civil Engineering Undergraduate Program**

The Civil Engineering program is accredited by the Engineering Accreditation Commission of ABET; see <http://www.abet.org>.

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed. Exclusive of General Education units, the minimum number of units required for the Civil Engineering major is 152 (77 units in lower division and 75 units in upper division).

## **Lower Division Required Courses**

UNITS

Mathematics 21A-21B-21C-21D ..... 16

Mathematics 22A-22B ..... 6

Physics 9A-9B-9C and choice of Physics 9D,

Chemistry 2C, Biological Science 2A or

Geology 50-50L ..... 19

Chemistry 2A-2B or 2AH-2BH ..... 10

Civil and Environmental Engineering 3,

16 ..... 6

(Civil and Environmental Engineering 3 is designed for lower division students and is not open to upper-division students.

Students who do not take this course will substitute four units of additional upper-division Civil and Environmental Engineering coursework.)

One course from: Civil and Environmental Engineering 19, Engineering 6, or Computer

Science Engineering 30 ..... 4

Engineering 35, 45 or 45Y ..... 8

English 3 or University Writing Program 1,

1V, or 1Y, or Comparative Literature 1, 2, 3,

or 4, or Native American Studies 5 (grade of C- or better) ..... 4

Communication 1 or 3 ..... 4

## **Upper Division Requirements:**

**Environmental Engineering.** This area focuses on understanding and management of physical, chemical, and biological processes in natural and engineered systems. Areas of emphasis include improvement of air, land, and water quality in the face of increasing population, expanding industrialization, and global climate change. Examples of environmental engineering include innovative analysis and design of air, water, wastewater, and solid waste treatment systems; mathematical modeling of natural and engineered systems; life cycle analysis; sampling, analysis, transport and transformation of natural and anthropogenic pollutants; and modeling of air pollutant emissions.

**Suggested Advisers.** C.E. Bronner, C. D. Cappa, J.L. Darby, A. Kendall, M.J. Kleeman, F. J. Loge, J.R. Lund, M.P. Modera, D.A. Niemeier, S.G. Schladow, T.M. Young

**Geotechnical Engineering.** This area deals with civil infrastructure and environmental problems that require quantifying the behavior of geologic materials (such as soils and rocks). Examples of geotechnical engineering problems include foundations for buildings and bridges, earthwork (such as dams, tunnels, highways), earthquake hazards (such as ground motions, liquefaction, soil-structure interaction), and geo-environmental problems (ground water flow, subsurface contaminant transport and remediation).

**Suggested Advisers.** R.W. Boulanger, Y.F. Dafalias, J.T. DeJong, J.T. Harvey, B. Jeremic, B.L. Kutter, P.C. Lucia

### Structural Engineering and Structural Mechanics

**Structural Engineering and Structural Mechanics.** Structural Engineering addresses the conception, sustainable design, analysis, construction, and life-cycle modeling of all types of civil infrastructure, including buildings, bridges, dams, ports, highways, and industrial facilities subject to sources of loadings ranging from gravity, to earthquakes, to extreme environmental events. Structural Mechanics encompasses the theory of solid structures, and the associated methods of analysis and computation used in the practice of Structural Engineering. For both disciplines, materials of particular interest include steel, reinforced concrete, timber, advanced composites and particulate media.

**Suggested Advisers.** J.E. Bolander, Y.K. Chai, L. Cheng, Y.F. Dafalias, J.T. Harvey, A.M. Kanvinde, S.K. Kunnath, B.H. Maroney, S.A. Miller, M.M. Rashid, N. Sukumar

### Transportation Planning and Engineering.

This area deals with the movement of people and goods in a manner consistent with society's environmental and socio-economic goals. Transportation engineering applies engineering, physical and mathematical sciences, economics, and behavioral social science principles to plan, analyze, design, and operate resilient and sustainable transportation systems, such as highways, transit, airfields and ports. Transportation planning involves the formulation and analysis of transportation policy, program, and project alternatives in consideration of societal goals, budgetary constraints, socio-economic (such as safety, equity and mobility) and environmental objectives (such as air and water quality, climate change, and clean energy), and technological feasibilities (such as vehicle, infrastructure, and information technologies).

**Suggested Advisers.** Y. Fan, J.T. Harvey, M.A. Jaller, A. Kendall, M.P. Modera, D.A. Niemeier, D. Sperling, H.M. Zhang

**Water Resources Engineering.** This area includes hydrology, hydraulics, fluid mechanics, and water resources systems planning and design. Hydrology deals with quantifying and understanding all aspects of the hydrologic cycle, including the relationships between precipitation, runoff, groundwater, and surface water. Water quality and contaminant transport issues are linked to hydrologic conditions. Hydraulics and fluid mechanics deal with flows in pipes, open-channel water-distribution systems, and natural systems, such as lakes and estuaries. Water resources systems planning and design deals with the comprehensive development of water resources to meet the multiple needs of industry, agriculture, municipalities, recreation, and other activities.

**Suggested Advisers.** F.A. Bombardelli, J.L. Darby, A.L. Forrest, J.D. Herman, M.L. Kavvas, J.R. Lund, S.G. Schladow, B.A. Younis

Additional information on areas of specialization and potential faculty advisers can be obtained from the departmental website.

## Civil Engineering

### Upper Division Required Courses

Engineering 103, 104, 104L, 106.....	12
Engineering 102 or 105.....	4
Civil and Environmental Engineering 114, 190.....	6
One course from Civil and Environmental Engineering 115, 153; Mathematics 118A; or Statistics 108 .....	4

<i>Civil &amp; Environmental Engineering Breadth</i> Select one course from four of the following group options: .....	14-17
---	-------

<i>Environment:</i> Civil and Environmental Engineering 140 or 148A or 149	
<i>Geotechnical:</i> Both Civil and Environmental Engineering 171 and 171 Lab	
<i>Structures:</i> Civil and Environmental Engineering 130	
<i>Transportation:</i> Civil and Environmental Engineering 161 or 163 or 165	
<i>Water Resources:</i> Both Civil and Environmental Engineering 141 and 141 Lab	

<i>Civil &amp; Environmental Engineering Depth</i> Select two courses from two of the following group options: .....	15-16
---	-------

<i>Environment:</i> Civil and Environmental Engineering 140, 148B, 150	
<i>Geotechnical:</i> Civil and Environmental Engineering 173, 175, 179	
<i>Structures:</i> Civil and Environmental Engineering 131, 132, 135, 136	
<i>Transportation:</i> Civil and Environmental Engineering 161, 162, 179	
<i>Water Resources:</i> Civil and Environmental Engineering 142, 144, 145, 146	
<i>Senior Design Requirement:</i> Must complete at least two of the following courses as part of the Civil & Environmental Engineering depth and elective: Civil & Environmental Engineering 127, 136, 145, 148B, 150, 162, or 173	
<i>Civil &amp; Environmental Engineering electives</i> .....	20
Civil & Environmental Engineering electives may include any upper division, letter-graded Civil & Environmental Engineering course not already used towards another degree requirement, Engineering 102 or 105, and may include, but not exceed, a combination of six units from Civil & Environmental Engineering 198 and 199.**	

<i>Upper Division Composition Requirement</i> .....	0-4
One course from the following (grade of C- or better is required): University Writing Program 101, 102E, 102G, 104A, 104E, 104T or passing the Upper Division Composition Exam.	

\* No unit of coursework may be used to satisfy two different degree requirements, i.e. although a course may be listed in more than one category, that course may only satisfy one requirement.  
 \*\* A maximum of 4 units of upper-division courses outside of Civil & Environmental Engineering may be considered on a petition basis. Please consult with the undergraduate staff adviser.

### Construction Engineering and Management Minor

To declare this minor program offered by the Department of Civil and Environmental Engineering, students must complete ENG 104 with a C- or better and submit a short personal statement focusing on academic and career goals, including relevant internships/experience. The online Minor Declaration form is available via the Online Advising Student Information System (OASIS) at <https://students.ucdavis.edu/>. Minimum overall UC GPA at time of declaration: 2.500.

All prerequisites must have been taken for a letter grade; no grade lower than a C- will be accepted in any prerequisite course.

Successful completion and transcript notation of the minor requires both a minimum overall UC GPA of 2.000 and a minimum 2.000 GPA for the coursework completed for the minor, with no grade lower than a C- for any course used for the minor.

### Minor Requirements:

Prerequisite courses must be completed prior to enrollment in coursework taken for minor.

UNITS

### Construction Engineering and Management ..... 24

Civil and Environmental Engineering 137, 143, 153 .....	12
---	----

Twelve units from:

Civil and Environmental Engineering 179, Agricultural and Resource Economics 112, 155, 157, 171A, 171B, Economics 134, 162; Environmental Science and Policy 161; may include one course from Agricultural and Resource Economics 18, Management 11A.....	12
---	----

**Minor advisers.** J.L. Darby, J.T. Harvey, J.R. Lund

### Sustainability in the Built Environment Minor

All courses must be taken for a letter grade. A grade of C- or better is required for all courses used to satisfy minor requirements with an overall GPA in minor requirement courses of 2.000 or better.

UNITS

### Sustainability in the Built Environment.. 20

Civil and Environmental Engineering 123, 143 .....	8
--	---

Twelve units from:

Civil and Environmental Engineering 125, 126, 127, 128, 148A, 149, 155, 162, 165, Engineering 188, Anthropology 101 (same as Environmental Science & Policy 101), 104N, Agricultural and Resource Economics 175, 176, Atmospheric Science 116, Community and Regional Development 142, 154, 172, Environmental Science and Policy 161, 162, 171, Environmental Toxicology 101, 102A, Geology 130, 134, Landscape Architecture 3, 180*, Plant Sciences 101, 141, 150, 162.....	12
---	----

\* Due to variability in series course offering, consent of minor adviser is required.

**Minor advisers.** F.J. Loge, A. Kendall

### The Graduate Program in Civil and Environmental Engineering

M.S. and Ph.D.; Designated Ph.D. emphasis available in Biotechnology  
<http://cee.engr.ucdavis.edu>  
 530-752-1441

With over thirty faculty members, over \$20 million in annual research expenditures and over 200 graduate students, the Department of Civil and Environmental Engineering integrates research, education and professional service in areas related to civil infrastructure and the environment. Graduate students benefit from close working relationships with professors who are the leading international experts in their field. They are supported in their study and research by robust funding, and they have access to state-of-the-art research centers. For example, the Center for Geotechnical Modeling, <http://cgm.engr.ucdavis.edu>, has the largest centrifuge of its kind in the nation and gives researchers access to their peers at other unique centers via high-speed networks. Since 1960, researchers at the J. Amoroco Hydraulics Laboratory (JAHL) have served the state of California by solving ecological, biological, environmental and hydraulic engineering problems. Students may also have the opportunity to work in one of the many modern environmental engineering

labs or the structural testing facilities in the department. Our graduates go on to serve the profession and academia by advancing the leading edge of fundamental knowledge, as well as engineering practice.

Generous financial support is available in the form of research assistantships, teaching assistantships, fellowships and financial aid. About 75% of the graduate students in our program are either fully or partially supported.

#### **Research Highlights:**

- Alternative fuel transportation infrastructure
- Earthquake engineering
- Environmental engineering
- Environmental planning and management
- Geotechnical engineering
- Hydraulics and fluid mechanics
- Hydrology
- Structural engineering
- Structural health monitoring
- Structural mechanics
- Systems planning and design
- Transportation engineering
- Transportation planning and design
- Water resources engineering

#### **Research Facilities and Partnerships:**

- Advanced Transportation Infrastructure Research Center
  - Center for Geotechnical Modeling
  - Center for Watershed Sciences
  - Center for Water-Energy Efficiency
  - Institute of Transportation Studies
  - J. Amorocho Hydraulics Laboratory (JAHL)
  - John Muir Institute of the Environment
  - Nano-Engineering and Smart Structures Technologies
  - Tahoe Environmental Research Center
  - Western Cooling Efficiency Center
- Complete Information on our website.

### **Courses in Engineering: Civil and Environmental (ECI)**

#### **Lower Division**

##### **3. Civil Infrastructure and Society (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 21A (may be taken concurrently). Pass One restricted to lower division students; Civil Engineering majors. Introduction to civil infrastructure and its relationship with society and the natural environment. Exposure to innovative research on civil engineering and environmental systems. Participation in laboratory experiments illustrative of the solution of representative but simplified engineering problems. Not open for credit to upper division students. GE credit: SciEng or SocSci | OL, SE or SS. —F. (F.) Darby

##### **16. Spatial Data Analysis (2)**

Lecture—1 hour; laboratory—3 hours. Restricted to Civil Engineering and Biological Systems Engineering majors; non-majors accommodated on a space-available basis. Computer-aided design and geographic information systems in civil engineering practice. GE credit: SciEng | QL, SE. —S. (S.) Fa, Bronner

##### **17. Surveying (2)**

Lecture—2 hours. Prerequisite: Physics 9A (may be taken concurrently). Restricted to Civil Engineering and Biological Systems Engineering majors; non-majors accommodated on a space-available basis. Theory behind and description of modern methods of land surveying in Civil Engineering. Offered irregularly. GE credit: SciEng | SE.

##### **19. C Programming for Civil and Environmental Engineers (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 21A (may be taken concurrently). Pass One open to Civil Engineering majors and Optical Science and Engineering majors. Computational problem solving techniques for Civil and Environmental Engineering applications using structured C programming. Algorithm design applied to realistic problems. Offered irregularly. GE credit: SciEng | SE.—Jeremic, Kleeman

##### **90X. Lower Division Seminar (1-4)**

Seminar—1-4 hours. Prerequisite: consent of instructor. Examination of a special topic in a small group setting. May be repeated for credit. GE credit: SciEng | SE.

##### **92. Internship in Engineering (1-5)**

Internship. Prerequisite: lower division standing; approval of project prior to period of internship. Supervised work experience in civil engineering. May be repeated for credit. (P/NP grading only.) GE credit: SE.

##### **98. Directed Group Study (1-5)**

Prerequisite: consent of instructor and lower division standing. (P/NP grading only.) GE credit: SE.

##### **99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor; lower division standing. (P/NP grading only.) GE credit: SE.

#### **Upper Division**

##### **114. Probabilistic Systems Analysis for Civil Engineers (4)**

Lecture—4 hours. Prerequisite: C- or better in Mathematics 21C. Probabilistic concepts and models in engineering. Statistical analysis of engineering experimental and field data. Introduction to stochastic processes and models of engineering systems. Not open for credit to students who have completed Statistics 120. GE credit: SciEng | QL, SE. —W, S. (W, S.)

##### **115. Computer Methods in Civil & Environmental Engineering (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 6 or Computer Science Engineering 30, and Mathematics 22B. Open to Civil Engineering majors only. Presentation, implementation and application of numerical algorithms and computer models for the solution of practical problems in Civil and Environmental Engineering. GE credit: SciEng | SE. —S. (S.) Sukumar, Younis

##### **119. Parallel Processing for Engineering Applications (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: C programming or consent of instructor. Fundamental skills in parallel computing for engineering applications; emphasis on structured parallel programming for distributed memory parallel clusters. Not open for credit to students who have completed course 119B. Offered irregularly. GE credit: SciEng | SE.—Kleeman, Jeremic

##### **123. Urban Systems and Sustainability (4)**

Lecture—4 hours. Prerequisite: upper division standing. Systems-level approach of how to evaluate and then modify sustainability of urban systems based on interaction with natural environments. Topics include: definition/metrics of urban sustainability; system analyses of urban systems; enabling technology, policies, legislation; measures and modification of ecological footprints. GE credit: SciEng or SocSci, Div, Wrt | ACGH, DD, SE, SL, SS, WE. —S. (S.) Kendall

##### **125. Building Energy Performance (4)**

Lecture—4 hours. Prerequisite: upper division standing in Engineering. Open to students in the College of Engineering. Mechanisms of energy consumption in buildings including end uses, thermal loads, ventilation, air infiltration, thermal energy distribution, and HVAC systems; energy performance simulation; methods and strategies of energy efficiency. Offered in alternate years. GE credit: SciEng | SE. —(S.) Modera

##### **126. Integrated Planning for Green Civil Systems (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Physics 9C or Landscape Architecture 60 or Design 145 or Environmental Science and Policy 100 or Nature and Culture 120 or Anthropology 100 or Statistics 32 or Plant Sciences 101; consent of instructor. Working within multidisciplinary teams, a heuristic learning environment, and multiple realistic constraints, an integrated design process will be applied to the planning of a project-based green and sustainable civil system. Offered irregularly. GE credit: SciEng | SE.

##### **127. Integrated Design for Green Civil Systems: Senior Design Experience (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 126; consent of instructor. Restricted to senior level standing. Working within multidisciplinary teams and a heuristic, project-based learning environment, a green and sustainable civil system will be designed. Evaluate various design options under architectural, structural, cost and environmental constraints, and present designs through oral and written presentations. Offered irregularly. GE credit: SciEng | SE.

##### **128. Integrated Construction for Green Civil Systems (4)**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 127. Working within multidisciplinary teams, a heuristic learning environment, and multiple realistic constraints, an integrated design process will be applied to the construction of a project-based green and sustainable civil system. Offered irregularly. GE credit: SciEng | SE.

##### **130. Structural Analysis (4)**

Lecture—4 hours. Prerequisite: C- or better in Engineering 104; Mathematics 22A. Open to Civil Engineering majors. Elastic structural analysis of determinate and indeterminate trusses, beams and frames. Plastic bending and limit analysis. GE credit: SciEng | QL, SE. —W, S. (F, S.)

##### **131. Matrix Structural Analysis (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: C- or better in Engineering 104; Engineering 6. Open to Engineering majors only. Matrix formulation and computer analysis of statically indeterminate structures. Stiffness and flexibility formulations for elastic structures. Finite element methods for elasticity and bending problems. Offered irregularly. GE credit: SciEng | SE. —S.

##### **132. Structural Design: Metallic Elements (4)**

Lecture—4 hours. Prerequisite: course 130. Design of metallic beams, columns, and other members for various types of loading and boundary conditions; design of connections between members; member performance within structural systems. GE credit: SciEng | SE, VL. —F. (W.) Bolander, Kanvinde

##### **135. Structural Design: Concrete Elements (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 130. Restricted to Civil Engineering, Civil Engineering/Materials Science and Engineering, and Materials Science and Engineering majors only. Strength design procedures for columns, rectangular beams, Tbeams and beams of general cross-section. Building code requirements for bending, shear, axial load, combined stresses and bond. Introduction to prestressed concrete. GE credit: SciEng | QL, SE. —W. (W.) Chai

##### **136. Building Design: Senior Design Experience (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 130 or 131; course 135 or 132. Restricted to senior level standing. Design of a building structure for a specific need under the multiple constraints of safety, serviceability, cost and aesthetics. Offered irregularly. GE credit: SciEng | SE. —S.

##### **137. Construction Principles and Project Management (4)**

Lecture—3 hours; laboratory—3 hours. Restricted to upper division standing in Engineering. Project management, with civil engineering construction and

design applications, including project scope, schedule, resources, cost, quality, risk, and control. Construction industry overview. Interactions between planning, design, construction, operations. Construction operations analysis. Contract issues. Project management software, field trips, guest lectures. Offered irregularly. GE credit: SciEng or SocSci | ACGH, OL, QL, SE or SS, VL, WE. —W. (W.) Harvey

### **138. Earthquake Loads on Structures (4)**

Lecture—3 hours; discussion—1 hours. Prerequisite: course 130 or 131. Determination of loads on structures due to earthquakes. Methods of estimating equivalent static lateral forces; response spectrum and time history analysis. Concepts of mass, damping and stiffness for typical structures. Design for inelastic behavior. Numerical solutions and Code requirements. GE credit: SciEng | SE. —W. (S.) Kunath

### **139. Advanced Structural Mechanics (4)**

Lecture—4 hours. Prerequisite: C or better in Engineering 104. Review of stress, strain, equilibrium, compatibility, and elastic material behavior. Plane stress and plane strain problems in elasticity; energy methods. Theories for unsymmetric bending, straight and curved beams. Beams on elastic foundations; stresses in plates and shells; elastic stability. Offered irregularly. GE credit: SciEng | SE. —Rashid, Sukumar

### **140. Environmental Analysis of Aqueous Systems (3)**

Lecture—3 hours. Prerequisite: Chemistry 2B. Introduction to chemical principles underlying current practices in sampling and analysis of water and wastewater. GE credit: SciEng | SE. —F. (F.) Darby, Young

### **140L. Environmental Analysis of Aqueous Systems Laboratory (1)**

Laboratory—3 hours. Prerequisite: Chemistry 2B or the equivalent; course 140 (may be taken concurrently). Restricted to Civil Engineering undergraduate and graduate students. Introduction to "wet chemical" and instrumental techniques commonly used in the examination of water and wastewater and associated data analysis. Offered irregularly. GE credit: SciEng | SE. —F. Darby

### **141. Engineering Hydraulics (3)**

Lecture—3 hours. Prerequisite: C or better in Engineering 103. Nature of flow of a real fluid; flow in pipes; open channel flow; turbomachinery; fluid forces on objects; boundary layers, lift and drag. GE credit: SciEng | SE. —F. W. (F. W.) Bombardelli, Schladow, Younis

### **141L. Engineering Hydraulics Laboratory (1)**

Laboratory—3 hours. Prerequisite: course 141 (may be taken concurrently). Open to Engineering students only. Laboratory experiments and demonstrations on flow measurement, sluice gates, hydraulic jump, flow characteristics, and centrifugal pumps. GE credit: SciEng | SE. —F. W. (F. W.) Bombardelli, Schladow, Younis

### **142. Engineering Hydrology (4)**

Lecture—4 hours. Prerequisite: course 141 (may be taken concurrently). Restricted to students in the College of Engineering. Hydrologic cycle. Evapotranspiration, interception, depression storage and infiltration. Streamflow analysis and modeling. Flood routing through channels and reservoirs. Frequency analysis of hydrologic variables. Precipitation analysis for hydrologic design. Hydrologic design. GE credit: SciEng | QL, SE. —F. (F.) Kavvas

### **143. Green Engineering Design and Sustainability (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 106; course 148A. Restricted to upper division standing; Pass One restricted to Civil Engineering majors. Application of concepts, goals and metrics of sustainability, green engineering and industrial ecology to engineering design. Other course topics include life-cycle assessments, analysis

of environmental management systems, and economics of pollution prevention and sustainability. GE credit: SciEng | QL, SE, SL, WE. —W. (W.) Bronner

### **144. Groundwater Systems Design (4)**

Lecture—4 hours. Prerequisite: course 141. Groundwater occurrence, distribution, and movement; groundwater flow systems; radial flow to wells and aquifer testing; aquifer management; groundwater contamination; solute transport by groundwater; fate and transport of subsurface contaminants. Groundwater supply and transport modeling. GE credit: SciEng | SE. —F. (F.)

### **144L. Groundwater Systems Design Laboratory (1)**

Laboratory—3 hours. Prerequisite: course 144, taken concurrently. Computer modeling of groundwater flow under regional gradient, well injection/withdrawal, and natural and engineered boundary conditions. Use of Groundwater Vista computer program. Offered irregularly. —Ginn

### **145. Hydraulic Structure Design: Senior Design Experience (4)**

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: C or better in course 141. Restricted to senior level standing. Project-based course covering the design of an integrated urban drainage system, including consideration of design alternatives, multiple realistic constraints (public safety, economic, environmental, sustainability and health), quantification of hydrologic uncertainty, codes and standards, design drawings and specifications and cost analysis. Offered irregularly. GE credit: SciEng | SE. —S. (S.) Younis

### **146. Water Resources Simulation (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103. Computer simulation techniques in the analysis, design and operation of surface water systems; modeling concepts and practices with application to surface runoff; water quality in rivers and streams and dispersion of contaminants in water bodies. GE credit: SciEng, Wrt | SE. —W. (W.) Bombardelli, Younis

### **148A. Water Quality Management (4)**

Lecture—4 hours. Prerequisite: C or better in Chemistry 2B. Basic concepts of water quality measurements and regulations. Introduction to physical, biological and chemical processes in natural waters. Fundamentals of mass balances in water and wastewater treatment. GE credit: SciEng | SE. —W. (W.) Bronner, Young

### **148B. Water and Wastewater Treatment System Design: Senior Design Experience (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: C or better in Engineering 103 and course 148A. Restricted to senior level standing. Design and evaluation of water and wastewater treatment systems. GE credit: SciEng | QL, SE, VL, WE. —S. (S.) Darby

### **149. Air Pollution (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21D, 22B; C or better in Chemistry 2B; Atmospheric Science 121A or C or better in Engineering 103. Physical and technical aspects of air pollution. Emphasis on geophysical processes and air pollution meteorology as well as physical and chemical properties of pollutants. (Same course as Atmospheric Science 149.) GE credit: SciEng | QL, SE, SL. —F. (F.) Cappa

### **150. Air Pollution Control System Design: Senior Design Experience (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: C or better in Atmospheric Science 149 or course 149. Restricted to senior level standing. Design and evaluation of air pollution control devices and systems. GE credit: SciEng | SE. —W. (W.) Cappa

### **153. Deterministic Optimization and Design (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 21C and 22A; computer programming course. Operations research. Optimization techniques such as linear programming, dynamic programming, and non-linear programming.

Applications in civil engineering disciplines, including multiple realistic constraints, through computer-based course projects. GE credit: SciEng | QL, SE, SL. —F. (F.) Fan

### **155. Water Resources Engineering Planning (4)**

Lecture—4 hours. Prerequisite: Engineering 106 or Economics 1A; course 114. Basic engineering planning concepts; role of engineering, economic, environmental and social information and analysis; institutional, political and legal aspects. Case studies and computer models illustrate the planning of water resource systems. GE credit: SciEng or SocSci, Wrt | QL, SE or SS, SL, WE. —S. (W.) Herman, Lund

### **161. Transportation System Operations (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: C or better in both Mathematics 21C and Physics 9A. Principles of transportation system operations; traffic characteristics and methods of measurement; models of transportation operations and congestion applied to urban streets and freeways. GE credit: SciEng | QL, SE. —F. (F.) Zhang

### **162. Transportation Land Use Sustainable Design: Senior Design Experience (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: C or better in course 148A or 161 or 163. Restricted to senior level standing. Interactions between land use and transportation systems design. Generalized design paradigm; project-based solutions for transportation land use. Students will select from various strategies to satisfy multiple constraints including cost, effectiveness and environmental sustainability. Oral, poster and written presentations required. GE credit: SciEng | SE, SL. —S. (S.) Nie-meier

### **163. Energy and Environmental Aspects of Transportation (4)**

Lecture—3 hours; extensive writing. Prerequisite: Economics 1A or Engineering 106. Engineering, economic, and systems planning concepts. Analysis and evaluation of energy, air quality and selected environmental attributes of transportation technologies. Strategies for reducing pollution and petroleum consumption in light of institutional and political constraints. Evaluation of vehicle emission models. (Same course as Environmental Science and Policy 163.) Offered in alternate years. GE credit: SciEng or SocSci, Wrt | SE or SS, SL, WE. —F. Sperling

### **165. Transportation Policy (3)**

Lecture—3 hours. Transportation and associated environmental problems confronting urban areas, and prospective technological and institutional solutions. Draws upon concepts and methods from economics, engineering, political science and environmental studies. Offered in alternate years. GE credit: SciEng or SocSci, Wrt | QL, SE or SS. —(F.) Sperling

### **171. Soil Mechanics (4)**

Lecture—4 hours. Prerequisite: C or better in Engineering 104; Engineering 103 (may be concurrent); course 171L (co-requisite). Restricted to Civil Engineering and Civil Engineering/Materials Science and Engineering majors only. Soil formations, mass-volume relationships, soil classification, effective stress, soil-water-void relationships, compaction, seepage, capillarity, compressibility, consolidation, strength, states of stress and failure, lateral earth pressures, and slope stability. GE credit: SciEng | SE. —F. S. (F. S.) Kutter

### **171L. Soil Mechanics Laboratory (1)**

Laboratory—3 hours. Prerequisite: course 171 must be taken concurrently. Laboratory studies utilizing standard testing methods to determine physical, mechanical and hydraulic properties of soil and demonstration of basic principles of soil behavior. GE credit: SciEng | SE. —F. S. (F. S.) Kutter

### **173. Foundation Design: Senior Design Experience (4)**

Lecture—4 hours. Prerequisite: course 171. Restricted to senior level standing. Soil exploration and determination of properties for design; design of shallow and deep foundations for bearing capacity and settlements; design of retaining structures;

selection and evaluation of foundation alternatives; excavation support and dewatering; major design experience and design report preparation. GE credit: SciEng | SE. —W. (W.) Boulanger

### **175. Geotechnical Earthquake Engineering (4)**

Lecture—4 hours. Prerequisite: C- or better in course 171. Earthquakes, faults, seismology and ground motions; complex notation for vibratory motions, the wave equation, reflection and refraction; dynamic soil properties, linear and nonlinear 1-D site response analysis; introduction to soil-structure interaction. Not open for credit to students who have taken course 287A. GE credit: SciEng | SE. —W. (W.) Boulanger, Kutter

### **179. Pavement Engineering (4)**

Lecture—3 hours; discussion/laboratory—3 hours. Prerequisite: C- or better in Engineering 104. Pavement types (rigid, flexible, unsurfaced, rail), their applications (roads, airfields, ports, rail) and distress mechanisms. Materials, traffic and environment characterization. Empirical and mechanistic-empirical design procedures. Maintenance, rehabilitation and reconstruction; construction quality; asphalt concrete mix design. GE credit: SciEng | QL, SE, SL, VL. —F. (F.) Harvey

### **189A. Selected Topics in Civil Engineering; Environmental Engineering (1-5)**

Prerequisite: consent of instructor. Directed group study in Environmental Engineering. May be repeated for credit when the topic is different. GE credit: SciEng | SE. —F, W, S. (F, W, S.)

### **189B. Selected Topics in Civil Engineering; Hydraulics and Hydrologic Engineering (1-5)**

Prerequisite: consent of instructor. Directed group study in Hydraulics and Hydrologic Engineering. May be repeated for credit when the topic is different. GE credit: SciEng | SE. —F, W, S. (F, W, S.)

### **189C. Selected Topics in Civil Engineering; Engineering Planning (1-5)**

Prerequisite: consent of instructor. Directed group study in Engineering Planning. May be repeated for credit when the topic is different. GE credit: SciEng | SE. —F, W, S. (F, W, S.)

### **189D. Selected Topics in Civil Engineering; Geotechnical Engineering (1-5)**

Prerequisite: consent of instructor. Directed group study in Geotechnical Engineering. May be repeated for credit when the topic is different. GE credit: SciEng | SE. —F, W, S. (F, W, S.)

### **189E. Selected Topics in Civil Engineering; Structural Engineering (1-5)**

Prerequisite: consent of instructor. Directed group study in Structural Engineering. May be repeated for credit when the topic is different. GE credit: SciEng | SE. —F, W, S. (F, W, S.)

### **189F. Selected Topics in Civil Engineering; Structural Mechanics (1-5)**

Prerequisite: consent of instructor. Directed group study in Structural Mechanics. May be repeated for credit when the topic is different. GE credit: SciEng | SE. —F, W, S. (F, W, S.)

### **189G. Selected Topics in Civil Engineering; Transportation Engineering (1-5)**

Prerequisite: consent of instructor. Directed group study in Transportation Engineering. May be repeated for credit when the topic is different. GE credit: SciEng | SE. —F, W, S. (F, W, S.)

### **189H. Selected Topics in Civil Engineering; Transportation Planning (1-5)**

Prerequisite: consent of instructor. Directed group study in Transportation Planning. May be repeated for credit when the topic is different. GE credit: SciEng | SE. —F, W, S. (F, W, S.)

### **189I. Selected Topics in Civil Engineering; Water Resources Engineering (1-5)**

Prerequisite: consent of instructor. Directed group study in Water Resources Engineering. May be repeated for credit when the topic is different. GE credit: SciEng | SE. —F, W, S. (F, W, S.)

### **189J. Selected Topics in Civil Engineering; Water Resources Planning (1-5)**

Prerequisite: consent of instructor. Directed group study in Water Resources Planning. May be repeated for credit when the topic is different. GE credit: SciEng | SE. —F, W, S. (F, W, S.)

### **190. The Civil Engineer in Society (2)**

Lecture—1 hours; laboratory—3 hours. Open to upper division Civil Engineering majors. The Civil Engineering profession; introduction to concepts in business, management, public policy and leadership including the importance of professional licensure and a discussion of professional ethical and societal issues related to civil engineering. GE credit: SocSci | SS. —F, S. (F, S.) Bronner, Kunath

### **190C. Research Group Conferences in Civil and Environmental Engineering (1)**

Discussion—1 hour. Prerequisite: upper division standing in Civil and Environmental Engineering; consent of instructor. Research group conferences. May be repeated for credit. (P/NP grading only.) GE credit: SE. —F, W, S. (F, W, S.)

### **192. Internship in Engineering (1-5)**

Internship. Prerequisite: upper division standing; approval of project prior to the period of the internship. Supervised work experience in civil engineering. May be repeated for credit. (P/NP grading only.) GE credit: SE. —F.

### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) GE credit: SE.

### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) GE credit: SE. —F, W, S. (F, W, S.)

### **Graduate**

#### **201. Introduction to Theory of Elasticity (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 104. Fundamental equations of elasticity in three dimensions; plane stress and plane strain; flexure and torsion of bars of various shapes. Introduction to variational and approximate methods. —F. (F.) Rashed

#### **203. Inelastic Behavior of Solids (3)**

Lecture—3 hours. Prerequisite: course 201. Fundamentals of theories of plasticity, viscoelasticity and viscoplasticity for solids. Macroscopic constitutive modelling for engineering materials, e.g., metals, polymers, soils, etc., and microscopic motivation. Offered in alternate years. —(W.) Dafalias

#### **205. Continuum Mechanics (3)**

Lecture—3 hours. Prerequisite: course 201. Tensor formulation of the field equations for continuum mechanics, including large deformation effects. Invariance and symmetry requirements. Introduction to nonlinear thermoelasticity and thermodynamics. Solution of three-dimensional problems. Selected topics. Offered in alternate years. —F. Dafalias

#### **206. Fracture Mechanics (4)**

Lecture—4 hours. Prerequisite: course 201; Engineering 104. Linear and nonlinear fracture mechanics, stress analysis, energy concepts, brittle fracture criteria, path independent integrals, Dugdale-Barenblatt model, general cohesive zone models, ductile fracture criteria, crack tip fields for stationary and propagating cracks, fatigue. Application of numerical methods for fracture mechanics. Offered in alternate years. —(W.) Sukumar

#### **211. Advanced Matrix Structural Analysis (4)**

Lecture—4 hours. Prerequisite: course 131. Analysis of complex frameworks by the displacement method; treatment of tapered beams, curved beams, and beams on elastic foundations; partially rigid connections; geometric and material nonlinearities; buckling; flexibility-based formulations; FEM-software for nonlinear analysis of structures. —F. (F.) Kunath

### **212A. Finite Element Procedures in Applied Mechanics (4)**

Lecture—4 hours. Prerequisite: Applied Science Engineering 115, or Mathematics 128A and Mathematics 128B (may be taken concurrently). Weighted-residual and Rayleigh-Ritz methods. Weak/variational formulation and development of discrete equations using finite element approximations.

Application to one- and two-dimensional problems (heat conduction). —W. (W.) Sukumar

### **212B. Finite Elements: Application to Linear and Non-Linear Structural Mechanics Problems (4)**

Lecture—4 hours. Prerequisite: course 212A. Application to linear and nonlinear structural mechanics problems. Linear elasticity, weak form, and finite element approximation. Incompressible media problems. Non-linear problems with material nonlinearity. —S. (S.) Sukumar

### **213. Analysis of Structures Subjected to Dynamic Loads (4)**

Lecture—4 hours. Prerequisite: course 211 (may be taken concurrently). Analysis of structures subjected to earthquake, wind and blast loading; distributed, consistent and lumped mass techniques; computer implementation; nonlinear response spectrum; frequency and time domain analysis; seismic protection of structures; numerical methods in linear and nonlinear structural dynamics. —F. (F.) Kunath

### **214. Probabilistic Seismic Hazard Analysis and Design Ground Motions (4)**

Lecture—4 hours. Probabilistic seismic hazard analysis for use in developing design spectra and for seismic risk analyses, including the development of earthquake ground motion time series for use in dynamic analyses of structures. Offered in alternate years. —F. (F.) Abrahamson

### **216. Meshfree Methods and Partition of Unity Finite Elements (4)**

Lecture—4 hours. Prerequisite: course 201 and 212A. Advanced discretization techniques such as meshfree methods and partition of unity finite elements for the Galerkin solution of boundary-value problems in solid and structural mechanics. Application of meshfree and extended finite element methods in computational fracture. Offered irregularly. —Sukumar

### **221. Theory of Plates and Introduction to Shells (3)**

Lecture—3 hours. Prerequisite: course 201 (may be taken concurrently). Development of classical and refined plate theories. Application to isotropic, orthotropic and composite plates. Solutions for rectangular and circular plates. Membrane theory for axisymmetric shells and bending of circular shells.

### **223. Advanced Dynamics, Signal Processing, and Smart Structures Technology (4)**

Lecture—4 hours. Prerequisite: course 213 or equivalent. Signal processing and system identification of structures under dynamic excitations; Fourier and Laplace transforms; data acquisition and sensor design fundamentals; sensor technologies/techniques for nondestructive evaluation; structural control; actuators and dampers for smart structures; piezoelectrics and acoustic emissions; micro- and nano-fabrication.

### **232. Advanced Topics in Concrete Structures (4)**

Lecture—4 hours. Prerequisite: course 130, 135, 138 and graduate standing. Ductility of reinforced concrete; strength of two-way slabs; modified compression field theory. —S. (S.) Chai

### **233. Advanced Design of Steel Structures (4)**

Lecture—4 hours. Prerequisite: courses 130 or 131, 132. Review of Load and Resistance Factor Design (LRFD); steel-plate girder design; plastic design of indeterminate systems; moment frames and bracing systems; connection design; seismic design of steel structures; vibration of flooring systems; steel-concrete composite design. —S. (S.) Bolander

**234. Prestressed Concrete (4)**

Lecture—4 hours. Prerequisite: courses 130 or 131, 135. Survey of methods and applications; prestressing materials and systems; prestress losses; flexural design; design for shear and torsion; deflection computation and control; continuous beams and indeterminate structures; floor systems; partial prestressing; design of compression members; strut-and-tie models. Offered in alternate years.—Bolander

**235. Cement Composites (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 104. Applications of cement composites; materials selection and proportioning; component and composite properties; hydration reactions and microstructure development; mechanisms of failure; nondestructive test methods; fiber reinforcement; concrete durability; novel reinforcing materials; reinforcement; repair and retrofit technologies; applications to structural design. Offered in alternate years.—W. Bolander

**236. Design of Fiber Reinforced Polymer Composite Structures (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 135. Basics of mechanics and design of polymer matrix composites: composite classification, manufacturing process, micromechanical property determination, classical lamination theory, strength theories, first-ply-failure, test methods, design practice, strengthening and retrofitting of existing reinforced concrete structures.—(S.) Cheng

**237. Bridge Design (4)**

Lecture—4 hours. Prerequisite: courses 130, 135; course 234 recommended. Open to graduate students only. Bridge types, behavior and construction characteristics; design philosophy, details according to Caltrans and American Association of State Highway and Transportation Officials codes, principles; seismic design and retrofit of concrete bridges; modern bridges using advanced fiber reinforced polymer composites; fieldtrip required.—S. (S.) Cheng

**238. Performance-Based Seismic Engineering (4)**

Lecture—4 hours. Prerequisite: Courses 138 and 213. Modern seismic design; performance-based seismic design; seismic hazard; seismic demands: linear and nonlinear procedures; performance assessment; deterministic and probabilistic procedure; review of FEMA-350, FEMA-356, ATC-40 and other performance-based guidelines.—(W.) Kunnath

**240. Water Quality (4)**

Lecture—4 hours. Prerequisite: courses 141 and 142. Quality requirements for beneficial uses of water. Hydrologic cycle of quality. Hydromechanics in relation to quality of surface and groundwaters; transport and fate of waterborne pollutants. Heat budget for surface waters; predictive methods; introduction to water quality modeling.—W. (W.) Schladow

**241. Environmental Reactive Chemical Transport Modeling (4)**

Lecture—4 hours. Prerequisite: Chemistry 2A, or Chemistry 2B, or course 149, or equivalent. Modeling of reactive chemical transport in air and water including kinetic reactions, equilibrium reactions, and phase partitioning. Emphasis on numerical solution schemes and programming techniques to provide deeper insight into model performance and limitations. Offered in alternate years.—S.s Kleeman

**242. Air Quality (4)**

Lecture—4 hours. Prerequisite: Engineering 105, course 141, 149 or the equivalent. Factors determining air quality. Effects of air pollutants. Physical and chemical fundamentals of atmospheric transport and reaction. Introduction to dispersion modeling. Offered in alternate years.—F. Kleeman

**243A. Water and Waste Treatment (4)**

Lecture—4 hours. Prerequisite: course 148A or the equivalent. Characteristics of water and airborne wastes; treatment processes and process kinetics; treatment system design.—F. (F.)

**243B. Water and Waste Treatment (4)**

Lecture—4 hours. Prerequisite: course 243A. Continuation of course 243A. Aeration, thickening, biological processes, design of biological treatment systems.—W. (W.) Loge

**243L. Pilot Plant Laboratory (4)**

Lecture—1 hour; Discussion—1 hour; Laboratory—6 hours. Prerequisite: course 243A and 243B (may be taken concurrently) or consent of instructor; graduate standing. Laboratory investigation of physical, chemical, and biological processes for water and waste-water treatment.—W. (W.) Darby

**244. Life Cycle Assessment for Sustainable Engineering (4)**

Lecture—4 hours. Prerequisite: graduate standing. Life cycle assessment methodology is taught emphasizing applications to infrastructure and energy systems. Life cycle design, life cycle cost methods, other tools from industrial ecology, and links to policy are covered as well.—(F.) Kendall

**245A. Applied Environmental Chemistry: Inorganic (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 105, Chemistry 2B or the equivalent, course 140; Chemistry 2C or 107A recommended. Chemistry of natural and polluted waters. Topics include chemical, kinetic and equilibrium principles, redox reactions, gas solution and solid-solution equilibria, thermodynamics, carbonate systems, coordination chemistry, interfacial phenomena. Offered in alternate years.—(S.) Young

**245B. Applied Environmental Chemistry: Organic (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 128A, 128B, 128C, or the equivalent; Chemistry 2C or 107A recommended. Transport and transformation of organic chemicals in the environment. Topics include application of thermodynamics to predict solubility and activity coefficients; distribution of organic chemicals between the aqueous phase and air, solvent, or solid phases; chemical, photochemical and biological transformation reactions. Offered in alternate years.—S. Young

**246. Pilot Plant Laboratory (4)**

Lecture—1 hour; discussion—1 hour; laboratory—6 hours. Prerequisite: course 243A, 243B (may be taken concurrently) or consent of instructor, graduate standing. Laboratory investigation of physical, chemical, and biological processes for water and waste-water treatment.—W. (W.) Darby

**246N. Understanding Climate Change: Causes and Consequences (4)**

Lecture—4 hours. Open to graduate students. Diverse physical processes that govern climate and drive climate change. Observational, experimental and modeling techniques and methods used in the development of our scientific understanding of the Earth system.—S. (S.) Cappa

**247. Aerosols (4)**

Lecture—4 hours. Prerequisite: Engineering 103, 105, course 141, 149. Behavior of airborne particles including particle formation, modification, and removal processes. Offered in alternate years.—F. Kleeman

**247L. Aerosols Laboratory (4)**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 247. Methods of generation and characterization of aerosols. Detailed topics may include flow rate measurement, aerosol generation, aerosol collection, ions measurement, metals measurement, and carbon measurement. May be repeated one time for credit.—Kleeman

**248. Biofilm Processes (4)**

Lecture—4 hours. Prerequisite: Soil Science 111 or 211 or course 243B or consent of instructor; calculus and basic cell molecular biology recommended. Natural and engineered biofilms, including biofilm occurrence and development, spatial structure, microbial processes, fundamental and applied research tools, biofilm reactors, beneficial uses, and detrimental effects.

**249. Probabilistic Design and Optimization (4)**

Lecture—4 hours. Prerequisite: courses 114 and 153 and Engineering 106, or equivalents. Design by optimization for probabilistic systems, decision theory, the value of information, probabilistic linear programming, probabilistic dynamic programming, nonlinear probabilistic optimization. Applications in civil engineering design, project evaluation, and risk management. Offered in alternate years.—W. Lund

**250. Civil Infrastructure System Optimization and Identification (4)**

Lecture—4 hours. Prerequisite: Mathematics 21C, 22A, programming course; Applied Science Engineering 115 and mathematical modeling course recommended. Applied mathematics with a focus on modeling, identifying, and controlling dynamic, stochastic, and underdetermined systems. Applications in transportation networks, water resource planning, and other civil infrastructure systems. Offered in alternate years.—(S.) Fan

**251. Transportation Demand Analysis (4)**

Lecture—4 hours. Prerequisite: course 114 or the equivalent. Procedures used in urban travel demand forecasting. Principles and assumptions of model components (trip generation, trip distribution, model split). New methods of estimating travel demand. Computer exercises using empirical data to calibrate models and forecast travel demand.—F. (F.) Nieheimer

**252. Sustainable Transportation Technology and Policy (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: course 165. Role of technical fixes and demand management in creating a sustainable transportation system. Emphasis on technology options, including alternative fuels, electric propulsion, and IVHS. Analysis of market demand and travel behavior, environmental impacts, economics and politics. (Same course as Environmental Science and Policy 252.) Offered in alternate years.—S. Sperling

**253. Dynamic Programming and Multistage Decision Processes (4)**

Lecture—4 hours. Prerequisite: Mathematics 21C, 22A, programming course; Applied Science Engineering 115 recommended. Operations research. Optimization techniques with a focus on dynamic programming in treating deterministic, stochastic, and adaptive multistage decision processes. Brief review of linear programming and non-linear programming. Applications in transportation networks and other civil infrastructure systems.—S. (S.) Fan

**254. Discrete Choice Analysis of Travel Demand (4)**

Lecture—4 hours. Prerequisite: course 114. Behavioral and statistical principles underlying the formulation and estimation of discrete choice models. Practical application of discrete choice models to characterization of choice behavior, hypothesis testing, and forecasting. Emphasis on computer exercises using real-world data sets. (Same course as Geography 279.)

**256. Urban Traffic Management and Control (4)**

Lecture—4 hours. Prerequisite: course 114. Basic concepts, models, and methods related to the branch of traffic science that deals with the movement of vehicles on a road network, including travel speed, travel time, congestion concepts, car-following and hydrodynamic traffic models.—F. (F.) Zhang

**257. Flow in Transportation Networks (4)**

Lecture—4 hours. Prerequisite: course 153; 161 or 256 recommended. Elements of graph theory, a survey of pertinent optimization techniques, extremal principles in network flow problems, deterministic equilibrium assignment, stochastic equilibrium assignment, extensions of equilibrium assignments and dynamic transportation network assignment.—W. (W.) Zhang

**258. Transportation Planning in Developing Countries (3)**

Lecture—3 hours. Prerequisite: course 160 or consent of instructor. Investigation of the role that transportation investments and policies play in the development of regions and countries. Emphasis is on identifying appropriate technologies, policies, and planning methods for designing transportation systems in regions of differing socioeconomic, geographic, and institutional settings. Offered in alternate years.—(S.) Sperling

**259. Asphalt and Asphalt Mixes (4)**

Lecture—4 hours. Prerequisite: course 179 or consent of instructor. Asphalts and asphalt mix types and their use in civil engineering structures, with primary emphasis on pavements. Asphalt, aggregate properties and effects on mix properties. Design, construction, recycling. Recent developments and research. Offered in alternate years.—(W.) Harvey

**260. Sediment Transport (4)**

Lecture—4 hours. Prerequisite: course 141 or equivalent. Sediment transport in hydrologic systems. Process-oriented course which will emphasize how sediment moves and the physical processes that affect sediment transport. Field trip. Offered in alternate years.

**264A. Transport, Mixing and Water Quality in Rivers and Lakes (4)**

Lecture—4 hours. Prerequisite: course 141 and 240. Principal causes of mixing and transport in rivers, lakes and reservoirs, and their impacts on water quality. Case studies of specific lakes and rivers. Offered in alternate years.—F. (S.) Schladow

**264B. Transport, Mixing and Water Quality in Estuaries and Wetlands (4)**

Lecture—4 hours. Prerequisite: courses 141 and 240. Principal causes of mixing and transport in estuaries and wetlands, and their impacts on water quality. Topics include advection/diffusion; tides; transverse mixing; longitudinal dispersion; sediment transport; nutrient cycling; computer modeling of estuaries. Case studies of specific systems. Offered in alternate years.—Schladow

**265. Stochastic Hydrology and Hydraulics (4)**

Lecture—4 hours. Prerequisite: course 266 or consent of instructor. Physics-based stochastic methods in modeling hydrologic and hydraulic processes; theory for modeling hydrologic-hydraulic governing equations as stochastic partial differential equations applied to various hydrologic-hydraulic processes under uncertainty, including transport, open channel flow, overland flow, soil water flow, and groundwater. Offered in alternate years.—(F.) Kavvas

**266. Applied Stochastic Methods in Engineering (4)**

Lecture—4 hours. Prerequisite: course 114 or Mathematics 131 or Statistics 130A or 131A; Mathematics 118A (may be taken concurrently). Stochastic processes classification; Gaussian random fields; stochastic calculus in mean square; Ito and Stratonovich stochastic differential equations; Fokker-Planck equation; stochastic differential equations with random coefficients. Offered in alternate years.—F. Kavvas

**267. Water Resource Management (3)**

Lecture—3 hours. Prerequisite: course 114, 141, and 142; course 153 recommended. Engineering, institutional, economic, and social basis for managing local and regional water resources. Examples in the context of California's water development and management. Uses of computer modeling to improve water management. (Same course as Geography 212.)—F. (F.) Lund

**268. Infrastructure Economics (3)**

Lecture—3 hours. Prerequisite: Economics 1A, Engineering 106 or the equivalent. Economics applied to infrastructure engineering planning, operations, maintenance, and management problems; microeconomic and macroeconomic theories; benefit-cost analysis; effect of uncertainty; optimization economics; non-classical economics; public finance. Offered in alternate years.—(W.) Lund

**269. Transportation-Air Quality: Theory and Practice (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 149 or the equivalent. Health and regulatory aspects of airborne pollutants. Principles of modeling vehicle emissions. Conformity issues and the regulatory framework. Regional and micro-scale modeling. Offered in alternate years.—S. Niemeier

**270. Advanced Water Resources Management (3)**

Lecture—3 hours. Prerequisite: courses 153 and 267 or the equivalent. Discussion of technical papers related to planning theory, system maintenance, regionalization, multi-objective methods, risk analysis, institutional issues, pricing model application, economic development, forecasting, operations, and other topics. Offered in alternate years.—Lund

**271. Inverse Problems (4)**

Lecture—3 hours. Prerequisite: courses 114 and 144 or equivalents. Inverse calibration of distributed parameter models, using data representing model outputs. Forward and inverse mappings, stability, uniqueness, identifiability. Optimization formulation of inverse problems, maximum likelihood and other objective functions, indirect and direct approaches, solution by UCODE in hands-on project format.

**272A. Advanced Hydrogeology (4)**

Lecture—4 hours. Prerequisite: course 144; Mathematics 118A recommended. Flow in confined, unconfined, and leaky aquifers. Geological aspects of aquifers. Regional groundwater flow and hydraulics of pumping and recharging wells. Identification of aquifer parameters. Isotope hydrogeology and recharge estimation.

**272B. Advanced Hydrogeology (4)**

Lecture—4 hours. Prerequisite: courses 212A and 272A. Processes of subsurface flows and transport. Numerical methods of subsurface fluid flow and transport systems. Flow in the unsaturated zone. Fresh water/salt water interface in coastal aquifers. Macrodispersion. Identification of regional aquifer parameters. Modeling of aquifer systems. Offered in alternate years.

**272C. Multiphase Reactive Transport (4)**

Lecture—4 hours. Prerequisite: courses 142, 144, 148A. Multicomponent reactive transport including multiple phases. Advective-dispersive transport, chemical equilibria, and mass transformation kinetics. Natural chemical/microbiological processes including sorption, complexation, biodegradation, and diffusive mass transfer. Eulerian and Lagrangian averaging methods. Applications to contaminant remediation problems in river and subsurface hydrology. Offered in alternate years.

**273. Water Resource Systems Engineering (3)**

Lecture—3 hours. Prerequisite: courses 114 and 153 or the equivalent. Planning, design, and management of water resource systems. Application of deterministic and stochastic optimization techniques. Water allocation, capacity expansion, and design and operation of reservoir systems. Surface water and groundwater management. Offered in alternate years.—(F.) Lund

**275. Hydrologic Time-Series Analysis (4)**

Lecture—4 hours. Prerequisite: course 114 and 142. Application of statistical methods for analysis and modeling of hydrologic series. Statistical simulation and prediction of hydrologic sequences using time series methodology. Offered in alternate years.—Kavvas

**276. Watershed Hydrology (4)**

Lecture—4 hours. Prerequisite: course 142 or the equivalent. Analysis and mathematical modeling of hydrologic processes taking place in a watershed. Precipitation analysis and modeling. Theory of overland flow and its kinematic wave approximation. Analysis and modeling of saturated and unsaturated subsurface flow processes taking place on a hill slope.—Kavvas

**277A. Computational River Mechanics I (4)**

Lecture—4 hours. Prerequisite: Applied Science Engineering 115, course 141 (both may be taken concurrently). Unsteady open channel flows, computation of water surface profiles, shallow water equations, St. Venant equations, method of characteristics, finite difference methods, stability and accuracy of explicit and implicit schemes, flood routing in simple and compound channels, advection of plumes. Not open for credit to students who have completed course 277.—F. (F.) Younis

**277B. Computational River Mechanics II (4)**

Lecture—4 hours. Prerequisite: course 277A. Open channel flows, physical aspects of river mechanics, formulation of depth-averaged equations, boundary conditions, coordinates transformation and grid generation, finite-difference solution techniques, applications to two-dimensional momentum and pollutant transport in rivers. Offered irregularly.—Younis

**277C. Turbulence and Mixing Processes (4)**

Lecture—4 hours. Prerequisite: graduate standing. Nature of turbulent flows, conservation equations, momentum, heat and mass transport in free and wall-bounded flows, body forces and mixing, roughness effects, turbulence modeling and simulation. Offered irregularly.—Younis

**278. Hydrodynamics (3)**

Lecture—3 hours. Prerequisite: course 141. Perturbation methods. Basic water waves. Governing equations for fluid motion on a rotating earth. Rotation effects, vorticity dynamics, Ekman layer. Stratification effects, internal waves and turbulent mixing. Combined effects. Offered in alternate years.—F.

**279. Advanced Mechanics of Fluids (4)**

Lecture—4 hours. Prerequisite: course 141. Rotational flows. Navier-Stokes equations and solutions for laminar flow; boundary layer equations and solution techniques. Nature of turbulence. Reynolds equations. Introduction to turbulence modeling. Offered in alternate years.—Bombardelli

**280A. Nonlinear Finite Elements for Elastic-Plastic Problems (4)**

Lecture—4 hours. Prerequisite: consent of instructor. State of the art finite element methods and tools for elastic-plastic problems, including computational techniques based on the finite element method and the theory of elastoplasticity. Offered in alternate years.—W. Jeremic

**280B. Nonlinear Dynamic Finite Elements (4)**

Lecture—4 hours. Prerequisite: consent of instructor. State of the art computational methods and tools for analyzing linear and nonlinear dynamics problems. Offered in alternate years.—S. Jeremic

**281A. Advanced Soil Mechanics (4)**

Lecture—4 hours. Prerequisite: course 171. Consolidation and secondary compression. Preloading and wick drains. Seepage and seepage pressures. Filtration, drainage, and dewatering. Shear strength: friction, cohesion, dilatancy and critical states.—F. (F.) Jeremic

**281B. Advanced Soil Mechanics (5)**

Lecture—4 hours; laboratory—3 hours. Prerequisite: course 281A. Site investigation and soil characterization within the context of slope stability analysis.—W. (W.) DeJong

**282. Pavement Design and Rehabilitation (4)**

Lecture—4 hours. Prerequisite: course 179 or consent of instructor. Advanced pavement design and structural/functional condition evaluation for concrete and asphalt pavements. Highways, airfields, port facilities; new facilities, rehabilitation, reconstruction. Mechanistic-empirical procedures, materials, climate and traffic characterization. Use of current design methods; recent developments and research. Offered in alternate years.—Harvey

**283. Physico-Chemical Aspects of Soil Behavior (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 171. Study of the geotechnical behavior of soils considering formation, transport, mineralogy,

soil/fluid/electrolyte systems, surface tension, particle mechanics, shape, fabric, and structure. Laboratories demonstrate effects of fundamental interparticle forces (contact, Van Der Waals, capillarity and chemical). Offered in alternate years.—F. Kutter

#### **284. Theoretical Geomechanics (4)**

Lecture—4 hours. Prerequisite: course 171. Elasticity, plasticity, micromechanics, coupled behavior and large deformations for geomaterials. Prediction of stress-strain-volume change behavior of geomaterials. Monotonic and cyclic loading, anisotropy, bifurcation of deformation.—W. (W.) Jeremic

#### **286. Advanced Foundation Design (4)**

Lecture—4 hours. Prerequisite: course 173. Design and analysis of pile and pier foundations, including seismic effects; deep excavation systems; tie-back, nailing, and anchor systems; coffer dams; loads on buried conduits; ground modification techniques; and other related topics.—F. (F.) DeJong

#### **287. Geotechnical Earthquake Engineering (4)**

Lecture—4 hours. Prerequisite: courses 138 and 281A. Characteristics and estimation of earthquake ground motions; wave propagation and local site response; liquefaction potential and remediation; residual strength and stability considerations; ground deformations; dynamic soil-structure interaction.—S. (S.) DeJong

#### **288. Earth and Rockfill Dams (4)**

Lecture—4 hours. Prerequisite: courses 281A and 281B (may be taken concurrently). Site selection; design considerations; layout; seismic effects including considerations of fault movements; construction; environmental considerations, instrumentation; maintenance remediation and retrofit of existing dams. Offered in alternate years.—(W.) Boulanger

#### **289A. Selected Topics in Civil Engineering; Environmental Engineering (1-5)**

Prerequisite: consent of instructor. Directed group study in Environmental Engineering. May be repeated for credit.—F, W, S. (F, W, S.)

#### **289B. Selected Topics in Civil Engineering; Hydraulics and Hydrologic Engineering (1-5)**

Prerequisite: consent of instructor. Directed group study in Hydraulics and Hydrologic Engineering. May be repeated for credit.—F, W, S. (F, W, S.)

#### **289C. Selected Topics in Civil Engineering; Engineering Planning (1-5)**

Prerequisite: consent of instructor. Directed group study in Engineering Planning. May be repeated for credit.—F, W, S. (F, W, S.)

#### **289D. Selected Topics in Civil Engineering; Geotechnical Engineering (1-5)**

Prerequisite: consent of instructor. Directed group study in Geotechnical Engineering. May be repeated for credit.—F, W, S. (F, W, S.)

#### **289E. Selected Topics in Civil Engineering; Structural Engineering (1-5)**

Prerequisite: consent of instructor. Directed group study in Structural Engineering. May be repeated for credit.—F, W, S. (F, W, S.)

#### **289F. Selected Topics in Civil Engineering; Structural Mechanics (1-5)**

Prerequisite: consent of instructor. Directed group study in Structural Mechanics. May be repeated for credit.—F, W, S. (F, W, S.)

#### **289G. Selected Topics in Civil Engineering; Transportation Engineering (1-5)**

Prerequisite: consent of instructor. Directed group study in Transportation Engineering. May be repeated for credit.—F, W, S. (F, W, S.)

#### **289H. Selected Topics in Civil Engineering; Transportation Planning (1-5)**

Prerequisite: consent of instructor. Directed group study in Transportation Planning. May be repeated for credit.—F, W, S. (F, W, S.)

#### **289I. Selected Topics in Civil Engineering; Water Resources Engineering (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Directed group study in Water Resources Engineering. May be repeated for credit.—F, W, S. (F, W, S.)

#### **290. Seminar (1)**

Seminar—1 hour. Discussion of current graduate research, and guest lectures on recent advances. Oral presentation of individual study. Course required of graduate degree candidates. (S/U grading only.)—F, W, S. (F, W, S.)

#### **290C. Graduate Research Group Conference (1)**

Discussion—1 hour. Research problems, progress, and techniques in civil engineering. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

#### **296. Topics in Water and Environmental Engineering (1)**

Seminar—2 hours. Seminars presented by visiting lecturers, UC Davis faculty and, graduate students. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

#### **298. Group Study (1-5)**

Prerequisite: consent of instructor. (S/U grading only.)

#### **299. Research (1-12)**

(S/U grading only.)

#### **Professional**

#### **390. The Teaching of Civil Engineering (1)**

Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in Civil Engineering. Participation as teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for total of 9 units. (S/U grading only.)—F, W, S. (F, W, S.)

## **Engineering: Computer Science**

(College of Engineering)

Nina Amenta, Ph.D., Chairperson of the Department

**Department Office.** 2063 Kemper Hall  
530-752-7004; <http://www.cs.ucdavis.edu>

#### **Faculty**

Nina Amenta, Ph.D., Professor  
Zhaojun Bai, Ph.D., Professor  
Matthew Bishop, Ph.D., Professor  
Hao Chen, Ph.D., Associate Professor  
Ian Davidson, Ph.D., Professor  
Premkumar T. Devanbu, Ph.D., Professor  
David Doty, Ph.D., Assistant Professor  
Raissa D'Souza, Ph.D., Professor  
Kurt Eiselt, Ph.D., LSOE  
Matthew K. Farrens, Ph.D., Professor  
Vladimir Filkov, Ph.D., Associate Professor  
Matthew Franklin, Ph.D., Professor  
Dipak Ghosal, Ph.D., Professor  
Daniel Gusfield, Ph.D., Professor  
Francios Gygi, Ph.D., Professor  
Bernd Hamann, Ph.D., Professor  
Cho-Jui Hsieh, Ph.D., Assistant Professor  
Patrice Koehl, Ph.D., Professor  
Yong Jae Lee, Ph.D., Assistant Professor  
Karl Levitt, Ph.D., Professor  
Xin Liu, Ph.D., Associate Professor  
Kwan-Liu Ma, Ph.D., Professor  
Norman S. Matloff, Ph.D., Professor  
Nelson Max, Ph.D., Distinguished Professor  
Prasant Mohapatra, Ph.D., Professor  
Biswanath Mukherjee, Ph.D., Distinguished Professor  
*Distinguished Graduate Mentoring Award*  
Michael Neff, Ph.D., Associate Professor  
Ronald A. Olson, Ph.D., Professor  
*Academic Senate Distinguished Teaching Award*

Engineering: Computer Science

289

Phillip Rogaway, Ph.D., Professor

Cindy Rubio Gonzalez, Ph.D., Assistant Professor

Zhendong Su, Ph.D., Professor

Ilias Tagkopoulos, Ph.D., Associate Professor

S. Felix Wu, Ph.D., Professor

#### **Emeriti Faculty**

John Bruno, Ph.D., Professor Emeritus

Kenneth I. Joy, Ph.D., Professor

*Academic Senate Distinguished Teaching Award*

Peter Linz, Ph.D., Professor Emeritus

Charles U. Martel, Ph.D., Professor

Raju Pandey, Ph.D., Associate Professor

Richard F. Walters, Ph.D., Professor Emeritus

*Academic Senate Distinguished Teaching Award*

#### **Affiliated Faculty**

Peer-Timo Bremer, Ph.D., Adjunct Associate Professor

Matt Butner, M.S., Lecturer

Sean Davis, M.S., Lecturer

Todd J. Green, Ph.D., Assistant Professor

Hans Hagen, Ph.D., Adjunct Professor

Rob Gysel, Ph.D., Lecturer

Bertram Ludaescher, Ph.D., Professor

Christopher Nitta, Ph.D., Assistant Adjunct Professor

Sean Peisert, Ph.D., Assistant Adjunct Professor

Massimo Tornatore, Ph.D., Adjunct Associate

Professor

Günther Weber, Ph.D., Assistant Adjunct Professor

## **The Computer Science and Engineering Program**

The Department of Computer Science administers two curricula: Computer Science and Engineering in the College of Engineering, and Computer Science in the College of Letters and Science. It also administers two minors: Computer Science in the College of Letters and Science, and Computational Biology in the College of Engineering. For information on the Computer Science curriculum and minor; see *Computer Science*, on page 230.

The Computer Science Engineering major (below) prepares students to do further work in hardware, software, theory, or electronics, either in industry or in postgraduate study.

The primary differences between the Computer Science Engineering and the Computer Science majors are the extent of course work covering hardware and the flexibility of the curriculum. The Computer Science Engineering major develops a solid understanding of the entire machine, including hands-on experience with its hardware components. The Computer Science major has some course work on hardware, at the digital-design level, on simulators. The Computer Science Engineering major has fewer free electives. The CS major's more generous electives make it easier to complete a minor or double major.

A key theme of the Computer Science Engineering curriculum is the hardware/software interaction, a theme reflected in the courses required and the orientation of the courses themselves.

The Computer Science and Engineering major provides students with a solid background in mathematics, physics, chemistry, and electronic circuits and systems, all supporting the computer hardware and computer software courses that constitute the focus of the curriculum.

**Mission.** The University of California, Davis, is, first and foremost, an institution of learning and teaching, committed to serving the needs of society. The Department of Computer Science contributes to the mission in three ways. First, its undergraduate and graduate education programs seek to educate students in the fundamental principles of computer science and the skills needed to solve the complex technological problems of modern society. The breadth of coursework provides a framework for lifelong learning and an appreciation for multidisciplinary activities. Second, through its research programs, the department contributes to the development and progress of computer science, and software and information technology, to provide innovative, creative solutions for societal needs. Finally, the department disseminates its research to

enhance collaborations with the public sector, further interdisciplinary interests that benefit society, and educate the public through publications, public service, and professional activities.

**Department Objectives.** **Teaching**—We seek to provide undergraduate students with a thorough understanding of the key principles and practices of computing, which include a strong theoretical background in mathematics, basic sciences, and engineering fundamentals and an ability to apply this knowledge to practical problems. We endeavor to provide students with sufficient breadth to work creatively and productively in multidisciplinary work teams; this breadth, in its broadest context, will form the basis for an appreciation and interest in life-long learning. We provide students with the opportunities to design and conduct experiments, and to collect and analyze data in core, as well as more specialized, areas of computer science. We provide students with breadth in the humanities and social sciences so they learn to communicate effectively, understand professional and ethical issues in society, and appreciate the interrelatedness between computing and society. We educate graduate students to be our next generation of teachers or leaders in industry, or to pursue meaningful, creative research in industry, government, or academia. **Research**—We develop and maintain research programs that produce fundamental scientific advances, as well as useful technological innovations, while simultaneously training the next generation of researchers and leaders in the field of computer science.

**Objectives.** We train graduates to practice computer science and engineering in a broad range of industries; we prepare interested graduates for graduate education or other professional degrees; we give students an understanding of computer software and hardware systems, and both theoretical and experimental approaches to problem solving; we ready graduates for lifelong learning; and we encourage graduates to contribute to their profession and society.

**Integrated Degree Program.** An integrated B.S./M.S. plan in Computer Science allows Davis students in Computer Science, Computer Science Engineering, or Computer Engineering to complete a master's degree in Computer Science in one year. Formal course work for the master's degree is reduced by six units for these students. Students can begin graduate studies immediately after completing their B.S. degree. More information is available in the graduate section of the College of Engineering Bulletin, or at <http://www.cs.ucdavis.edu/graduate/bs-ms.html>.

## Computer Science and Engineering Undergraduate Program

The Computer Science and Engineering program is accredited by the Engineering Accreditation Commission of ABET; see <http://www.abet.org>.

Exclusive of General Education units, the minimum number of units for the Computer Science and Engineering major is 142.

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

### Lower Division Required Courses

	UNITS
Mathematics 21A-21B-21C-21D .....	16
Mathematics 22A or 67 .....	3-4
Mathematics 22B .....	3
Physics 9A-9B-9C-9D .....	19
Chemistry 2A.....	5
Computer Science Engineering 20, 30, 40, 60.....	16
Computer Science Engineering 50 or Electrical and Computer Engineering 70 .....	4
Engineering 17 .....	4
English 3 or University Writing Program 1, 1V, 1Y or Comparative Literature 1, 2, 3, or	

4, or Native American Studies 5 (grade of C- or better required) .....	4
Communication 1 .....	4

### Upper Division Requirements:

#### Upper Division Required Courses

Computer Science Engineering 132, 140A, 150, 152A, 154A, 154B, 160, 188, 193A, 193B.....	32
Computer Science Engineering 120 or 122A.....	4
Electrical and Computer Engineering 100, 172.....	9
Computer Science electives .....	15
A minimum of four courses and a minimum of 15 units chosen from Computer Science Engineering courses numbered 120 to 189 inclusive; one approved course of 3 to 5 units from Computer Science and Engineering 192 or 199; Electrical and Computer Engineering 180A, 180B; Economics 122; Linguistics 177; Psychology 120. No course can count as both a required course and a computer science and engineering elective.	
Upper Division Composition	
Requirement .....	0-4
University Writing Program 101 (a grade of C- or better is required) or passing the Upper-Division Composition Exam.	

#### Computational Biology Minor

The minor in Computational Biology will provide to students with engineering, physical science or biological science majors the foundations necessary to build efficient computational models and algorithms, use state-of-the-art techniques for scientific analysis and create scalable infrastructure environments for biological and biotechnological applications.

Students must take a total of 19-24 upper division units, with two required courses and 11-12 units of upper division electives, as specified below. A minimum GPA of 2.000 is required for coursework in the minor. Students should note that most of the courses listed below have lower division prerequisites. In particular, required course Computer Science Engineering 122A has a prerequisite chain of Computer Science Engineering 20, 30, 40, and 60. No more than one course will be permitted for overlap between any major and the minor.

#### Minor Requirements:

	UNITS
<b>Computational Biology .....</b>	<b>20</b>
Required courses .....	8
Engineering: Computer Science 122A; 124	
Electives .....	12
At least one biology course from the following: Molecular & Cellular Biology 121, 124, 182; Evolution and Ecology 100, 101, 102, 103, 131; Biological Sciences 101, 104, 122	
At least one computational or statistics course from the following: Computer Science Engineering 130, 132, 140, 145, 158, 160, 165A, 170, 177; Statistics 130A, 141; Biotechnology 150; Biological Sciences 132	
At least one computational biology and bioinformatics course from the following: Computer Science Engineering 129; Biological Sciences 132; Biomedical Engineering 117, Biotechnology 150	

**Minor Advisers.** T. Pham, N. Coulter, V. Filkov, D. Gusfield, P. Koehl, I. Tagkopoulos

## Courses in Engineering: Computer Science (ECS)

### Lower Division

#### 10. Introduction to Programming (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: two years of high school algebra. Pass One open to Computer Science, Computer Science Engineering,

Computer Engineering, Electrical Engineering Majors only. A hands-on introduction to computation, through programming and problem solving. Two units of credit for students who have taken course 12 or Engineering 6; not open to students who have completed course 30. GE credit: SciEng | QL, SE, SL.—F, W, S. (F, W, S.) Eiselt, Max

#### 12. Introduction to Media Computation (4)

Lecture—3 hours; discussion/laboratory—1 hour. Introduction to key computational ideas necessary to understand and produce digital media. Fundamentals of programming are covered as well as analysis of how media are represented and transmitted in digital form. Aimed primarily at non-computer science students. Two units of credit for students that have taken course 10 or course 30 or Engineering 6. (Same course as Cinema and Technocultural Studies 012.) GE credit: ArtHum or SciEng | AH or SE, VL.—W. (W.) Neff

#### 15. Introduction to Computers (4)

Lecture—3 hours; laboratory—3 hours. Not open for credit to students who have completed course 30. Computer uses in modern society. Emphasis on uses in nonscientific disciplines. Includes word processing, spreadsheets, web-page creation, elementary programming, basic computer organization, the Internet, the uses of computers and their influence on society. Course not intended for CS or CSE majors. Only two units of credit allowed to students who have completed Plant Science 21. GE credit: SciEng, Wrt | QL, SE, WE.—F, W. (F, W.) Butner, Eiselt

#### 20. Discrete Mathematics for Computer Science (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: grade of C- or better in Mathematics 16A, 17A or 21A. Discrete mathematics of particular utility to computer science. Proofs by induction. Propositional and first-order logic. Sets, functions, and relations. Big-O and related notations. Recursion and solutions of recurrence relations. Combinatorics. Probability on finite probability spaces. Graph theory. GE credit: SciEng | QL, SE.—F, W, S. (F, W, S.) Koehl, D'Souza, Filkov

#### 30. Programming and Problem Solving (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A or 21A (may be taken concurrently); prior experience with basic programming concepts (variable, loops, conditional statements) recommended. Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, and Electrical Engineering Majors only. Introduction to computers and computer programming, algorithm design, and debugging. Elements of good programming style. Programming in the C language. Use of basic UNIX tools. GE credit: SciEng | QL, SE.—F, W, S. (F, W, S.) Butner, Gysel

#### 40. Software Development and Object-Oriented Programming (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 30 or the equivalent with a grade of C- or better. Pass One open to Computer Science, Computer Science Engineering, Computer Engineering, and Electrical Engineering Majors only. Elements of program design, style, documentation, efficiency. Methods for debugging and verification. Operating system tools. Principles and use of object-oriented programming in C++. Basic data structures and their use. GE credit: SciEng | SE, VL.—F, W, S. (F, W, S.) Chen, Davis, Gygi

#### 50. Computer Organization and Machine-Dependent Programming (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: grade of C- or better in course 40. Pass One open to Computer Science, Computer Science Engineering, and Computer Engineering Majors only. Comparative study of different hardware architectures via programming in the assembly languages of various machines. Role of system software in producing an abstract machine. Introduction to I/O devices and programming. Only one unit of credit allowed for students who have taken Electrical and Computer Engineering 70. GE credit: SciEng | SE.—F, W, S. (F, W, S.) Butner, Eiselt

**60. Data Structures and Programming (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 20, 40 (C++ and UNIX); grade of C- or better in each course. Design and analysis of data structures for a variety of applications. Trees, heaps, searching, sorting, hashing, graphs. Extensive programming. GE credit: SciEng | QL, SE.—F, W, S. (F, W, S.) Davi

**89A. Special Topics in Computer Science; Computer Science Theory (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Computer Science Theory. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**89B. Special Topics in Computer Science; Architecture (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Architecture. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**89C. Special Topics in Computer Science; Programming Languages and Compilers (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Programming Languages and Compilers. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**89D. Special Topics in Computer Science; Operating Systems (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Operating Systems. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**89E. Special Topics in Computer Science; Software Engineering (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Software Engineering. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**89F. Special Topics in Computer Science; Databases (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Databases. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**89G. Special Topics in Computer Science; Artificial Intelligence (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Artificial Intelligence. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**89H. Special Topics in Computer Science; Computer Graphics (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Computer Graphics. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**89I. Special Topics in Computer Science; Networks (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Programming Networks. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**89J. Special Topics in Computer Science; Computer-Aided Design (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Computer-Aided Design. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**89K. Special Topics in Computer Science; Scientific Computing (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Scientific Computing. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**89L. Special Topics in Computer Science; Computer Science (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Computer Science. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**92. Internship in Computer Science (1-5)**

Internship. Prerequisite: lower division standing; project approval prior to period of internship. Supervised work experience in computer science. May be repeated for credit. (P/NP grading only.)

**98. Directed Group Study (1-5)**

(P/NP grading only.)

**98F. Student Facilitated Course (1-4)**

Prerequisite: consent of instructor. Student facilitated course intended primarily for lower division students. (P/NP grading only.) Offered irregularly.

**99. Special Study for Lower Division Students (1-5)**

(P/NP grading only.)

**Upper Division****120. Theory of Computation (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 20 or Mathematics 108. Pass One open to Computer Science, Computer Science Engineering, and Computer Engineering Majors only. Fundamental ideas in the theory of computation, including formal languages, computability and complexity. Reducibility among computational problems. GE credit: SciEng | QL, SE.—F, W, S. (F, W, S.) Doty, Gysel

**122A. Algorithm Design and Analysis (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 20, 60. Pass One open to Computer Science, Computer Science Engineering, and Computer Engineering Majors only. Complexity of algorithms, bounds on complexity, analysis methods. Searching, sorting, pattern matching, graph algorithms. Algorithm design techniques: divide-conquer, greedy, dynamic programming. Approximation methods. NP-complete problems. GE credit: SciEng | SE.—F, W, S. (F, W, S.) Bai, Gysel, Filkov

**122B. Algorithm Design and Analysis (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 122A. Pass One open to Computer Science, Computer Science Engineering, and Computer Engineering Majors only. Theory and practice of hard problems, and problems with complex algorithm solutions. NP-completeness, approximation algorithms, randomized algorithms, dynamic programming and branch and bound. Theoretical analysis, implementation and practical evaluations. Examples from parallel, string, graph, and geometric algorithms. GE credit: SciEng | QL, SE.—F, (F.) Gysel

**124. Theory and Practice of Bioinformatics (4)**

Lecture—3 hours; laboratory—1 hour. Prerequisite: course 10 or 30 or Engineering 6; Statistics 12 or 13 or 32 or 100 or 131A or Mathematics 135A; Biological Science 2A or Molecular and Cellular Biology 10. Pass One open to Computer Science, Computer Science Engineering, and Biotechnology majors only. Fundamental biological, mathematical and algorithmic models underlying bioinformatics and systems biology; sequence analysis, database search, genome annotation, clustering and classification, functional gene networks, regulatory network inference, phylogenetic trees, applications of common bioinformatics tools in molecular biology and genetics. GE credit: SciEng | SE.—F, (F.) Tagkopoulos

**127. Cryptography (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 20 or Mathematics 108. Pass One open to Computer Science and Computer Science Engineering Majors only. Introduction to the theory and practice of cryptographic techniques used in computer security. Encryption (secret-key and public-key), message authentication, digital signatures, entity authentication, key distribution, and other cryptographic protocols. The social context of cryptography. GE credit: SciEng | QL, SE, SL.—Franklin, Rogaway

**129. Computational Structural Bioinformatics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: college level programming course; Biological Science 2A or Molecular and Cellular Biology 10. Pass One open to Computer Science, Computer Science Engineering, and Biotechnology majors only. Fundamental biological, chemical and algorithmic models underlying computational structural biology; protein structure and nucleic acids structure; comparison of protein structures; protein structure prediction; molecular simulations; databases and online services in computational structural biology. GE credit: SciEng | SE.—F, (F.) Koehl

**130. Scientific Computation (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 30 or Engineering 6; Mathematics 22A or Mathematics 67. Pass One open to Computer Science and Computer Science Engineering Majors only. Matrix-vector approach using MATLAB for floating-point arithmetic, error analysis, data interpolation, least squares data fitting, quadrature, zeros, optimization and matrix eigenvalues and singular values. Parallel computing for matrix operations and essential matrix factorizations. GE credit: SciEng | SE.—W, (W.) Bai

**132. Probability and Statistical Modeling for Computer Science (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 40; course 50 or Engineering Electrical and Computer 70; Mathematics 21C; Mathematics 22A or Mathematics 67. Pass One open to Computer Science and Computer Science Engineering Majors only. Univariate and multivariate distributions. Estimation and model building. Markov/Hidden Markov models. Applications to data mining, networks, security, software engineering and bioinformatics. GE credit: SciEng | QL, SE.—F, W, (F, W.) Ghosal, Matloff

**140A. Programming Languages (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 50 or Electrical Computer Engineering 70; course 60. Pass One open to Computer Science, Computer Science Engineering, and Computer Engineering Majors only. Syntactic definition of programming languages. Introduction to programming language features including variables, data types, data abstraction, object-orientedness, scoping, parameter disciplines, exception handling. Non-imperative programming languages. Comparative study of several high-level programming languages. GE credit: SciEng | SE.—F, W, S. (F, W.) Olsson, Nitta, Su

**140B. Programming Languages (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 140A. Pass One open to Computer Science and Computer Science Engineering Majors only. Continuation of programming language principles. Further study of programming language paradigms such as functional and logic; additional programming language paradigms such as concurrent (parallel); key implementation issues for those paradigms; and programming language semantics. Offered in alternate years. GE credit: SciEng | SE.—Levitt, Olson, Pandey

**142. Compilers (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 20, 140A; course 120 recommended. Pass One open to Computer Science and Computer Science Engineering Majors only. Principles and techniques of lexical analysis, parsing, semantic analysis, code generation, and code optimization. Implementation of compilers. GE credit: SciEng | SE.—Pandey, Su

**145. Scripting Languages and Their Applications (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: programming skill at the level of course 60. Pass One open to Computer Science and Computer Science Engineering Majors only. Goals and philosophy of scripting languages, with Python and R as prime examples. Applications include networking,

data analysis and display, and graphical user interfaces (GUIs). Offered in alternate years. GE credit: SciEng | SE. —F. (F.) Matloff

### **150. Operating Systems and System Programming (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 40; course 50 or Electrical and Computer Engineering 170. Pass One open to Computer Science, Computer Science Engineering, and Computer Engineering Majors only. Basic concepts of operating systems and system programming. Processes and interprocess communication/synchronization; virtual memory, program loading and linking; file and I/O subsystems; utility programs. Study of a real operating system. GE credit: SciEng | SE.—W, S. (W, S.) Levitt, Wu

### **152A. Computer Networks (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 60; course 132 or Electrical and Computer Engineering 161 or Mathematics 135A or Statistics 131A, or Statistics 120 or Statistics 32. Pass One open to Computer Science and Computer Science Engineering Majors only. Overview of computer networks, TCP/IP protocol suite, computer-networking applications and protocols, transport-layer protocols, network architectures, Internet Protocol (IP), routing, link-layer protocols, local area and wireless networks, medium access control, physical aspects of data transmission, and network-performance analysis. Only 2 units of credit for students who have taken course 157. (Same course as Electrical and Computer Engineering 173A.) GE credit: SciEng | SE.—F, W, S. (F, W, S.) Ghosal, Mukherjee

### **152B. Computer Networks (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 152A or Electrical and Computer Engineering 173A. Pass One open to Computer Science and Computer Science Engineering Majors only. TCP/IP protocol suite, computer networking applications, clientserver and peer-to-peer architectures, application-layer protocols, transport-layer protocols, transport-layer interfaces, sockets, network programming, remote procedure calls, and network management. GE credit: SciEng | SE.—Ghosal, Matloff, Mohapatra, Mukherjee

### **152C. Advanced Topics in Computer Networks (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 152A or Electrical and Computer Engineering 173A. Advanced topics in computer networks, wireless networks, multimedia networking, traffic analysis and modeling, network design and management, network simulation and performance analysis, and design projects in communication networks. (Same course as Electrical and Computer Engineering 173B.) Offered in alternate years. GE credit: SciEng | SE.—Chauhan, Liu, Mukherjee

### **153. Computer Security (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 150, 152A. Pass One open to Computer Science and Computer Science Engineering Majors only. Principles, mechanisms, and implementation of computer security and data protection. Policy, encryption and authentication, access control, and integrity models and mechanisms; network security; secure systems; programming and vulnerabilities analysis. Study of an existing operating system. Not open for credit to students who have completed course 155. GE credit: SciEng | SE.—F. (F.) Bishop

### **154A. Computer Architecture (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 50 or Electrical and Computer Engineering 70. Introduction to digital design. Interfacing of devices for I/O, memory and memory management. Input/output programming, via wait loops, hardware interrupts and calls to operating system services. Hardware support for operating systems software. GE credit: SciEng | SE.—F, W. (F, W.) Butner, Davis

### **154B. Computer Architecture (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 154A or both Electrical and Computer Engineering 170 and Electrical and Computer Engineer-

ing 180A. Pass One open to Computer Science and Computer Science Engineering Majors only. Hardwired and microprogrammed CPU design. Memory hierarchies. Uniprocessor performance analysis under varying program mixes. Introduction to pipelining and multiprocessors. GE credit: SciEng | SE.—W, S. (W, S.) Farrens

### **158. Programming on Parallel Architectures (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 150 and 154B recommended. Pass One open to Computer Science and Computer Science Engineering Majors only. Techniques for software development using the shared-memory and message-passing paradigms, on parallel architectures and networks of workstations. Locks, barriers, and other techniques for synchronization. Introduction to parallel algorithms. GE credit: SciEng | SE.—F. (F.) Gygi

### **160. Software Engineering (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 140A. Pass One open to Computer Science and Computer Science Engineering Majors only. Requirements, specification, design, implementation, testing, and verification of large software systems. Study and use of software engineering methodologies. Team programming. GE credit: SciEng | SE.—F, W. (F, W.) Nitta

### **163. Information Interfaces (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 60. Pass One open to Computer Science and Computer Science Engineering Majors only. Art and science of information visualization and interfaces for information systems. Design principles of human-computer interaction. Visual display and navigation of nonspatial and higher dimensional data. Implementations, performance issues, tradeoffs, and evaluation of interactive information systems. GE credit: SciEng | SE, VL.—W. (W.) Ma

### **165A. Database Systems (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 60. Pass One open to Computer Science and Computer Science Engineering Majors only. Database modeling and design (E/R model, relational model), relational algebra, query languages (SQL), file and index structures, query processing, transaction management. GE credit: SciEng | SE.—F. (F.) Nitta

### **165B. Database Systems (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 165A. Pass One open to Computer Science and Computer Science Engineering Majors only. Data modeling (object-relational, graph-based, spatiotemporal models). Querying semistructured data (XML). Database theory (normalization, integration, provenance). Database programming (stored procedures, embedded SQL, web programming). Advanced topics (data warehousing, parallel data processing). GE credit: SciEng | SE.—S. (S.)

### **170. Introduction to Artificial Intelligence (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 60. Pass One open to Computer Science and Computer Science Engineering Majors only. Design and implementation of intelligent computer systems. Knowledge representation and organization. Memory and inference. Problem solving. Natural language processing. GE credit: SciEng | SE.—W. (W.) Davidson

### **171. Machine Learning (4)**

Lecture—3 hours; discussion—1 hour. Pass One open to Computer Science and Computer Science Engineering Majors only. Introduction to machine learning. Supervised and unsupervised learning, including classification, dimensionality reduction, regression and clustering using modern machine learning methods. Applications of machine learning to other fields. GE credit: SciEng | SE.—F. (F.) Tagkopoulos

### **173. Image Processing and Analysis (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 60; Mathematics 67 or C- or better in Mathematics 22A. Pass One open to Computer Science and Computer Science Engineering Majors only.

Techniques for automated extraction of high-level information from images generated by cameras, three-dimensional surface sensors, and medical devices. Typical applications include detection of objects in various types of images and describing populations of biological specimens appearing in medical imagery. GE credit: SciEng | SE.—S. (S.)

### **174. Computer Vision (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 60; Mathematics 22A or Mathematics 67. Pass One open to Computer Science and Computer Science and Engineering Majors only. Computer vision is the study of enabling machines to "see" the visual world (e.g., understand images and videos). Explores several fundamental topics in the area, including feature detection, grouping and segmentation, and recognition. GE credit: SciEng | SE.—S. (S.) Lee

### **175. Computer Graphics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 60; Mathematics 22A or Mathematics 67. Pass One open to Computer Science and Computer Science Engineering Majors only. Principles of computer graphics, with a focus on interactive systems. Current graphics hardware, elementary operations in two-and threedimensional space, geometric transformations, camera models and interaction, graphics system design, standard graphics APIs, individual projects. GE credit: SciEng | SE, VL.—F, W. (F, W.) Hamann, Joy

### **177. Scientific Visualization (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 175. Pass One open to Computer Science and Computer Science Engineering Majors only. Computer graphics techniques for generating images of various types of measured or computer-simulated data. Typical applications for these graphics techniques include study of air flows around car bodies, medical data, and molecular structures. GE credit: SciEng | SE, VL.—W. (W.) Max

### **178. Geometric Modeling (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 175. Pass One open to Computer Science and Computer Science Engineering Majors only. Interactive graphics techniques for defining and manipulating geometrical shapes used in computer animation, car body design, aircraft design, and architectural design. GE credit: SciEng | SE, VL.—S. (S.) Hamann

### **188. Ethics in an Age of Technology (4)**

Lecture/discussion—4 hours. Prerequisite: upper division standing. Pass One open to Computer Science and Computer Science Engineering Majors only. Foundations of ethics. Views of technology. Technology and human values. Costs and benefits of technology. Character of technological change. Social context of work in computer science and engineering. GE credit: SocSci, Wrt | SS, SL, WE.—F, W, S. (F, W, S.) Davidson, Eiselt, Gusfield, Koehl, Matlaff, Rogaway

### **189A. Special Topics in Computer Science; Computer Science Theory (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Computer Science Theory. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

### **189B. Special Topics in Computer Science; Architecture (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Architecture. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

### **189C. Special Topics in Computer Science; Programming Languages and Compilers (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Programming Languages and Compilers. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189D. Special Topics in Computer Science; Operating Systems (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Operating Systems. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189E. Special Topics in Computer Science; Software Engineering (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Software Engineering. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189F. Special Topics in Computer Science; Databases (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Databases. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189G. Special Topics in Computer Science; Artificial Intelligence (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Artificial Intelligence. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189H. Special Topics in Computer Science; Computer Graphics (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Computer Graphics. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189I. Special Topics in Computer Science; Networks (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Networks. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189J. Special Topics in Computer Science; Computer-Aided Design (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Computer-Aided Design. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189K. Special Topics in Computer Science; Scientific Computing (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Scientific Computing. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189L. Special Topics in Computer Science; Computer Science (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Computer Science. May be repeated for credit when topic differs. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189M. Special Topics in Computer Science; Computer Security (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Computer Security. May be repeated for credit when topic differs. Offered irregularly.

**189N. Special Topics in Computer Science; Bioinformatics and Computational Biology (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Bioinformatics and Computational Biology. May be repeated for credit when topic differs. Offered irregularly.

**190C. Research Group Conferences in Computer Science (1)**

Discussion—1 hour. Prerequisite: upper division standing in Computer Science and Engineering; consent of instructor. Research group conferences. May be repeated for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

**190X. Senior Seminar (2)**

Seminar—2 hours. Prerequisite: senior standing. Examination of a special topic in a small group setting.

**192. Internship in Computer Science (1-5)**

Internship. Prerequisite: completion of a minimum of 84 units; project approval prior to period of internship. Supervised work experience in computer science. May be repeated for credit. (P/NP grading only.)

**193A. Senior Design Project (2)**

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 160 recommended (may be concurrent) or consent of instructor. Pass One open to Computer Science Engineering Majors only; Pass Two open to Computer Science and Computer Science Engineering Majors only. Team design project involving analysis, design, implementation and evaluation of a large-scale problem involving computer and computational systems. The project is supervised by a faculty member. Students must take course 193A and 193B to receive credit. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | SE.—W. (W.) Liu

**193B. Senior Design Project (2)**

Lecture—1 hour; laboratory—3 hours. Prerequisite: IP grade in course 193A. Pass One open to Computer Science Engineering Majors only; Pass Two open to Computer Science and Computer Science Engineering Majors only. Team design project involving analysis, design, implementation and evaluation of a large-scale problem involving computer and computational systems. The project is supervised by a faculty member. Students must take course 193A and 193B to receive credit. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | SE.—S. (S.) Liu

**197T. Tutoring in Computer Science (1-3)**

Discussion—1 hour; laboratory/discussion—3-6 hours. Prerequisite: consent of instructor. Restricted to upper-division standing. Tutoring in computer science courses, especially introductory courses. (P/NP grading only.)—F, W, S. (F, W, S.)

**198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**198F. Student Facilitated Course (1-4)**

Prerequisite: consent of instructor. Student facilitated course intended primarily for upper division students. (P/NP grading only.) Offered irregularly.

**199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.)

**199FA. Student Facilitated Course Development (1-4)**

Prerequisite: course 3 or University Writing Program 1; consent of instructor. STU FAC. Under the supervision of a faculty member, an undergraduate student plans and develops the course they will offer under 98F/198F. (P/N grading only.) Offered irregularly.

**199FB. Student Facilitated Teaching (1-4)**

Prerequisite: course 199FA; consent of instructor. STU FAC. Under the supervision of a faculty member, an undergraduate student teaches a course under 98F/198F. (P/N grading only.) Offered irregularly.

**The Graduate Program in Computer Science**

Doctoral and Masters degrees in Computer Science are offered through the interdisciplinary Graduate Group in Computer Science. Please see <http://www.cs.ucdavis.edu> and Computer Science (A Graduate Group), on page 230, for a description of graduate education offerings, requirements, group faculty and research foci.

**Graduate****201A. Advanced Computer Architecture (4)**

Lecture—3 hours; term paper. Prerequisite: course 154B or Electrical and Computer Engineering 170; course 150. Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Modern research topics and methods in computer architecture. Design implications of memory latency and

bandwidth limitations. Performance enhancement via within-processor and between-processor parallelism. Term project involving student-proposed extensions/modifications of work in the research literature. Not open for credit to students who have completed course 250A.—F. (F.) Farrens

**201B. High-Performance Uniprocessing (4)**

Lecture—3 hours; term paper. Prerequisite: course 201A. Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Maximizing uniprocessor performance. Barriers to high performance; solutions to the problems; historical and current processor designs. Not open for credit to students who have completed course 250B. Offered in alternate years.—(W.) Farrens

**201C. Parallel Architectures (4)**

Lecture—3 hours; project—1 hour. Prerequisite: course 201A. Evolution of parallel architectures from special-purpose machines to commodity servers. Emphasis on recent machines and applications that drive them. Not open for credit to students who have completed course 250C.

**203. Novel Computing Technologies (4)**

Lecture—3 hours; project—1 hour. Prerequisite: course 201A. Pass One and Pass Two open to Graduate Students in Computer Science only. Novel computing technologies that could revolutionize computer architecture. Quantum computing technologies, including algorithms, devices, and fault tolerance. A survey of other unconventional technologies including nanoscale electronics, MEMS devices, biological devices, and nanotechnology. Offered in alternate years.—(W.) Chong

**220. Theory of Computation (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 120, 122A. Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Time and space complexity classes. Reductions, completeness, and the role of randomness. Logic and undecidability.—W. (W.) Doty

**221. Computational Methods in Systems and Synthetic Biology (4)**

Lecture—3 hours; discussion—1 hour. Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Computational methods related to systems and synthetic biology. An overview of machine learning techniques related to the analysis of biological data, biological networks. Predictive modeling and simulation of biological systems. Topics on biological circuit construction.—F. (F.) Tagkopoulos

**222A. Design and Analysis of Algorithms (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 122A; Statistics 31A recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Techniques for designing efficient algorithms, analyzing their complexity and applying these algorithms to a broad range of applications. Methods for recognizing and dealing with difficult problems.—S. (F.) Gysel

**222B. Advanced Design and Analysis of Algorithms (4)**

Lecture—3 hours; project—1 hour. Prerequisite: course 222A. Pass One and Pass Two open to Graduate Students in Computer Science only. Advanced topics in complexity theory. Problem classification. The classes P, NP, P-space, co-NP. Matching and network flow algorithms. Matrix multiplication. Approximation algorithms.—(W.) Gusfield, Franklin, Martel, Rogaway

**223. Parallel Algorithms (4)**

Laboratory/discussion—3 hours; project—1 hour. Prerequisite: course 222A. Pass One and Pass Two open to Graduate Students in Computer Science only. Models of parallel computer systems including PRAMs, loosely coupled systems and interconnection networks. Parallel algorithms for classical problems and general techniques for their design and analysis. Proving lower bounds on parallel computation in several settings. Offered in alternate years.—(F.) Amenta, Martel

**224. String Algorithms and Applications in Computational Biology (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 122A. Pass One and Pass Two open to Graduate Students in Computer Science only. Algorithms that operate on strings. Pattern matching, sets of patterns, regular expression pattern matching, suffix trees and applications, inexact similarity, parametric sequence alignment, applications to DNA sequencing and protein database searching. Offered in alternate year.—(F.) Gusfield

**225. Graph Theory (3)**

Lecture—3 hours. Prerequisite: graduate standing in electrical engineering or computer science or consent of instructor. Pass One and Pass Two open to Graduate Students in Computer Science only. Fundamental concepts. Vector spaces and graphs. Planar graphs: Whitney's and Kuratowski's theorems. Topological parameters: packings and coverings. Connectivity: Menger's theorem. Hamilton graphs: Posa's and Chvatal's theorems. Graph factorization: Tutte's theorem. Graph coloring: Brooks; and Vizing's theorem.—S. (W.) Gusfield

**226. Computational Geometry (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 175, 222A. Pass One and Pass Two open to Graduate Students in Computer Science only. Mathematics of unstructured data. Algorithms for data structures such as Voronoi diagrams, oct-trees, and arrangements. Applications in computer graphics, concentrating on problems in three-dimensions. Offered in alternate years.—(S.) Amenta, Max

**227. Modern Cryptography (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 220 or 222A. Pass One and Pass Two open to Graduate Students in Computer Science only. Modern cryptography as a discipline emphasizing formal definitions and proofs of security. One-way functions, pseudo-randomness, encryption, digital signatures, zero-knowledge, secure protocols. Offered in alternate years.—(W.) Rogaway

**228. Cryptography for E-Commerce (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 222A. Pass One and Pass Two open to Graduate Students in Computer Science only. Cryptographic primitives and protocols of importance to e-commerce, present and future, including content distribution mechanisms, payment mechanisms, pricing mechanisms, anonymity and privacy mechanisms, fair exchange mechanisms. Offered in alternate years.—(W.) Franklin

**229. Advanced Computational Structural Bioinformatics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing. Pass One and Pass Two open to Graduate Students in Computer Science only. Algorithmic problems in structural biology; protein structure classification; protein structure prediction (including comparative modeling and ab initio protein structure prediction); molecular simulations (molecular dynamics and Monte Carlo simulations). Offered in alternate years.—(W.) Koehl

**230. Applied Numerical Linear Algebra (4)**

Laboratory/discussion—3 hours; discussion—1 hour. Prerequisite: course 130 or Engineering Applied Science 209 or Mathematics 167. Pass One and Pass Two open to Graduate Students in Computer Science only. Numerical linear algebra (NLA) with emphasis on applications in engineered systems; matrix factorizations; perturbation and rounding error analyses of fundamental NLA algorithms.—S. (S.) Gygi

**231. Large-Scale Scientific Computation (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 130. Pass One and Pass Two open to Graduate Students in Computer Science only. Algorithms and techniques for large-scale scientific computation, including basics for high performance computing, iterative methods, discrete approximation, fast Fourier transform, Poisson solvers, particle methods, spectral graph partition and its applications. Offered in alternate years.—(S.) Bai

**234. Computational Functional Genomics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 124; graduate standing in Computer Science or Life Sciences. Pass One and Pass Two open to Graduate Students in Computer Science only. Bioinformatics methods for analysis and inference of functional relationships among genes using large-scale genomic data, including methods for integration of gene expression, promoter sequence, TF-DNA binding and other data, and approaches in modeling of biological networks.—(W.) Filkov

**235A. Computer and Information Security (4)**

Lecture—3 hours; project. Prerequisite: course 150; course 152A recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Modern topics in computer security, including: protection, access control, operating systems security, network security, applied cryptography, cryptographic protocols, secure programming practices, safe languages, mobile code, malware, privacy and anonymity, and case studies from real-world systems. Not open for credit to students who have taken course 235.—F. (F.) Chen

**235B. Foundations of Computer and Information Security (4)**

Lecture—3 hours; project. Prerequisite: course 235A; courses 120, 150 recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Theoretical foundations of methods used to protect data in computer and communication systems. Access control matrix and undecidability of security; policies; Bell-LaPadula, Biba, Chinese Wall models; non-interference and non-deducibility; information flow and the confinement problem. Not open for credit to students who have taken course 235.—W. (W.) Bishop

**236. Computer Security: Intrusion Detection Based Approach (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 150; 153 recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Concepts of intrusion detection, anomaly detection based on machine learning, signature-based detection using pattern matching, automated response to attacks using artificial intelligence planning, tracing intruders based on principal component analysis, security policy languages. Offered in alternate years.—(S.) Levitt

**240. Programming Languages (4)**

Lecture—3 hours; discussion—1 hour. Prerequisites: courses 140A; 142. Pass One and Pass Two open to Graduate Students in Computer Science only. Advanced topics in programming languages, including formal syntax and semantics, the relation between formal semantics and verification, an introduction to the lambda calculus. Additional topics will include language design principles, alternative programming languages, in-depth semantic theory and models of language implementation.—W. (W.) Su

**242. Translation of Programming Languages (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 240. Pass One and Pass Two open to Graduate Students in Computer Science only. Lexical analysis, parsing, storage management, symbol table design, semantic analysis and code generation. LR, LALR grammars. Compiler-compilers.—(S.) Pandey

**243. Code Generation and Optimization (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 201A or Engineering Electrical and Computer 270. Pass One and Pass Two open to Graduate Students in Computer Science only. Compiler optimizations for performance, code size and power reduction. Topics include control- and data-flow analysis, redundancy elimination, loop and cache optimizations, register allocation, local and global instruction scheduling, and modulo scheduling.—(W.) Wilken

**244. Principles of Concurrent Programming (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 20, 150. Pass One and Pass Two open to Graduate Students in Computer Science only. Fundamental concepts and applications of concurrent programs; concurrent program verification and derivation; synchronization mechanisms in programming languages; distributed programming techniques; case studies of languages.—F. (F.) Olsson

**247. Concurrent Programming Languages (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 140A, 150. Pass One and Pass Two open to Graduate Students in Computer Science only. Language design parameters. Models of parallel machines. Load balancing. Scalability. Portability. Efficiency measures. Design and implementation techniques for several classes of concurrent programming languages (such as object-oriented, functional, logic, and constraint programming languages).—(F.) Olsson, Pandey

**251. Operating Systems (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 150. Pass One and Pass Two open to Graduate Students in Computer Science only. Models, design, implementation, performance evaluation in operating systems. Algorithms, internal architectures for single processor OS and distributed systems. Concurrency control, recovery, security. OS kernel-level programming. Special topics embedded systems, real-time system, device driver, NPU (Network Processor Unit).—S. (S.) Nitta

**252. Computer Networks (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 152B. Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Internet protocol based computer networks applications, transport, network layer protocols. High speed LAN technologies: Ethernet, Asynchronous Transfer Mode (ATM). Delay models in data networks: analysis of multi-access techniques in polling, ring, random access networks. Multimedia applications requirements and design.—(S.) Ghosal, Mukherjee, Mohapatra

**253. Network Theory and Applications (4)**

Lecture/discussion—4 hours. Prerequisite: Mathematics 22A; Mathematics 22B; Statistics 13 or 120; experience with computer software; or consent of instructor. Develops the mathematical theory underlying growth, structure and function of networks with applications to physical, social, biological and engineering systems. Topics include network growth, resilience, epidemiology, phase transitions, software and algorithms, routing and search control, cascading failures. (Same course as Mechanical & Aeronautical Engineering 253.) Offered in alternate years.—(S.) D'Souza

**255. Resource Management in Wireless Communication Networks (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 252A. Advanced research issues in wireless communication networks, including multi-user diversity and cross-layer optimization, basic network information theory, MIMO systems and the impact on networks, and dynamics spectrum management. Offered in alternate years.—(S.) Liu

**256. Performance Evaluation (4)**

Lecture—3 hours; project—1 hour. Prerequisite: courses 20, 152A, 154A-B or Electrical and Computer Engineering 170, Statistics 131A; course 150 recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Use of simulation and queueing theory in computer and communication system design. Applications to processor scheduling, memory hierarchies; I/O systems; packet and circuit switched networks; fault-tolerance; computer networks applications. Not open for credit to students who have completed course 256A.

Offered in alternate years.—(F., W.) Ghosal, Matloff, Mohapatra, Mukherjee

**257. Mobile and Wireless Networks (4)**

Lecture—3 hours; independent study. Prerequisite: course 252. Pass One and Pass Two open to Graduate Students in Computer Science only. Fundamental techniques in design of second generation wireless networks: cellular network and protocols, medium access techniques, handoff control, signaling and mobility management, wireless data works, Internet mobility and Personal Communication Services (PCS). Third generation wideband systems, novel technologies, adhoc networks. Offered in alternate years.—(F.) Ghosal, Mohapatra, Mukherjee

**258. Networking Architecture and Resource Management (4)**

Lecture—3 hours; project. Prerequisite: course 152A or Electrical & Computer Engineering 173A. Pass One and Pass Two open to Graduate Students in Computer Science and Electrical and Computer Engineering only. Concepts and design principles of computer networks. Network architectures, protocol mechanisms and implementation principles (transport/network/data-link layers), network algorithms, router mechanisms, design requirements of applications, network simulation, modeling and performance analysis. (Same course as Electrical & Computer Engineering 273.) Offered in alternate years.—W. (W.) Chaudhuri, Mohapatra

**259. Optical Networks (4)**

Lecture—3 hours; independent study. Prerequisite: course 252. Pass One and Pass Two open to Graduate Students in Computer Science only. Optical networks. Enabling technologies. Multiplexing techniques. WDM. Broadcast networks. Wavelength-routed networks. Network architectures. Protocols. Network algorithms. Device-network interface. Optimization problems. Offered in alternate years.—(F.) Ghosal, Mukherjee

**260. Software Engineering (4)**

Lecture—3 hours; project. Prerequisite: course 142; course 160 recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Advanced techniques for domain-specific software reuse.—W. (W.) Devanbu

**261. Program Verification (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 125 or Philosophy 112 or familiarity with first-order logic; knowledge of an iterative and functional programming language. Methods of proving correctness of programs with respect to formal specifications, with attention to those suited for employing automated deduction. Logic background, symbolic execution, techniques suited to iterative programming, methods from denotational semantics, termination, dynamic logic and proofs of concurrent programs. Offered in alternate years.—(F.) Levitt

**262. Formal Specification (3)**

Lecture—3 hours. Prerequisite: course 261. Pass One and Pass Two open to Graduate Students in Computer Science only. Formal specification of modules, and its relationship to top-down programming development and verification. Abstract data types, together with methods for specifying them. Implementations and proofs of implementation. Using specifications to reason about programs. Parameterized types. Constructing good formal specifications. Offered in alternate years.—(W.) Levitt

**265. Distributed Database Systems (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 165A. Pass One and Pass Two open to Graduate Students in Computer Science only. Concepts of distributed database systems and architectures, distributed database design, distributed query processing and optimization, transaction management and concurrency control, heterogeneous and multidatabase systems.—(S.) Ludaescher

**266. Spatial Databases (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 165A. Concepts, models, and architectures for spatial databases, spatial access methods, query processing, spatio-temporal data management, moving objects, spatial data mining. Offered in alternate years.—(W.) Ludaescher

**267. Wide-Area Distributed Information Systems (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 152B or 165A. Pass One and Pass Two open to Graduate Students in Computer Science only. Wide-area distributed information systems, data broadcast, multicast, publish/subscribe, service differentiation, information retrieval, Web caching. Offered in alternate years.—(S.)

**268. Scientific Data And Workflow Management (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 165A. Scientific data integration, metadata, knowledge representation, ontologies, scientific workflow design and management. Offered in alternate years.—(W.) Ludaescher

**270. Artificial Intelligence (3)**

Lecture—3 hours. Prerequisite: courses 140A, 172. Pass One and Pass Two open to Graduate Students in Computer Science only. Concepts and techniques underlying the design and implementation of models of human performance on intelligent tasks. Representation of high-level knowledge structures. Models of memory and inference. Natural language and story understanding. Common sense planning and problem solving.—(W.) Levitt

**271. Machine Learning and Discovery (4)**

Lecture—3 hours; project—1 hour. Prerequisite: course 170. Pass One and Pass Two open to Graduate Students in Computer Science only. Artificial intelligence techniques for knowledge acquisition by computers. Fundamental problems in machine learning and discovery. Systems that learn from examples, analogies, and solved problems. Systems that discover numerical laws and qualitative relationships. Projects centering on implementation and evaluation. Offered in alternate years.—(S.) Levitt, Vemuri

**272. Information Visualization (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 163 or 175 recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Advanced topics in information visualization: perceptually effective display methods, color design and selection, interaction models and techniques, focus-context techniques, distortion methods, large graph visualization techniques, visual data mining methods, and evaluation methods.—(W.) Ma

**273. Applied Visual Computing (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: graduate standing. Visual computing paradigms, current visualization technologies, principles of 3-D graphics, user interface designs, and exploratory visualization. Offered in alternate years.—(F.) Hamann, Joy, Ma, Max

**274. Automated Deduction (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 125 or Philosophy 112 or familiarity with first-order logic. Techniques of mechanical theorem proving. Methods based on resolution and term-rewriting. Decision procedures. Induction. Applications to program verification, question/answering and plan generation. Study existing mechanical theorem provers. Offered in alternate years.—(S.) Levitt

**275A. Advanced Computer Graphics (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 175 or 177 or 178. Pass One and Pass Two open to Graduate Students in Computer Science only. Advanced topics in computer graphics. Hidden surface models, rendering of various surface types, subdivision methods, shading techniques, anti-aliasing, modeling techniques.—W. (W.)

**275B. Advanced Computer Graphics (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 175 or 177 or 178. Pass 1 and Pass 2 open to Graduate Students in Computer Science only. Advanced topics in computer graphics and geometric modeling. Topics taken from advanced research papers in computer graphics, image synthesis, visualization and geometric modeling. Discussion of current research in the field. Offered in alternate years.—(W.) Joy, Hamann, Ma

**276. Advanced Volume Visualization (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 177. Pass One and Pass Two open to Graduate Students in Computer Science only. Applications, available tools and techniques, the challenges confronting the field of volume visualization, and some of the advanced topics in the field. Primary emphasis on advanced software and hardware techniques to achieve interactive visualization. Offered in alternate years.—(S.) Hamann, Joy, Ma, Max

**277. Advanced Visualization (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 177. Visualization of 3D data, including scalar fields, vector fields, and medical data.—W. (W.) Ma

**278. Computer-Aided Geometric Design (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 175. Mathematical techniques for the definition and manipulation of curves and surfaces, Bezier curves and surfaces, B-spline curves and surfaces, subdivision surfaces, wavelets. Integration into various computer graphics rendering models, visualization systems and computer-aided design systems. Offered in alternate years.—S. (S.) Hamann, Joy

**279. Computer Animation (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 175 or 275. Pass One and Pass Two open to Graduate Students in Computer Science only. Course surveys current research and fundamental techniques that lie behind character animation tools. Emphasis on improving expressive aspects of movement and how physics, motion capture data, the arts and psychology literature, and interactive techniques can be used towards this goal. Offered in alternate years.—S. Neff

**280. Virtual Reality Technology (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 175. Pass One and Pass Two open to Graduate Students in Computer Science only. Fundamentals and principles of Virtual Reality (VR) technology. Potential and limits for its useful application. Developing a complete virtual reality application. Offered in alternate years.—(S.) Joy

**289A. Special Topics in Computer Science; Computer Science Theory (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Computer Science Theory. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289B. Special Topics in Computer Science; Architecture (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Architecture. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289C. Special Topics in Computer Science; Programming Languages and Compilers (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Programming Languages and Compilers. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289D. Special Topics in Computer Science; Operating Systems (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Operating Systems. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289E. Special Topics in Computer Science; Software Engineering (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Software Engineering. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289F. Special Topics in Computer Science; Databases (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Databases. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289G. Special Topics in Computer Science; Artificial Intelligence (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Artificial Intelligence. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289H. Special Topics in Computer Science; Computer Graphics (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Computer Graphics. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289I. Special Topics in Computer Science; Networks (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Networks. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289J. Special Topics in Computer Science; Computer-Aided Design (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Computer-Aided Design. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289K. Special Topics in Computer Science; Scientific Computing (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Scientific Computing. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289L. Special Topics in Computer Science; Computer Science (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Computer Science. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289M. Special Topics in Computer Science; Security (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Security. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289N. Special Topics in Bioinformatics and Computational Biology (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Bioinformatics and Computational Biology. May be repeated for credit when topic differs. Offered irregularly.

**290. Seminar in Computer Science (1)**

Seminar—1 hour. Participating seminar; discussion and presentation of current research and development in computer science. (S/U grading only.)—F, W, S. (F, W, S.)

**290C. Graduate Research Group Conference (1)**

Discussion—1 hour. Research problems, progress and techniques in computer science. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**293A. Research in Computer Science (1)**

Lecture—1 hour. Prerequisite: graduate standing in computer science. Pass One and Pass Two open to Graduate Students in Computer Science only. Study of research topics in computer science, Ph.D. level research methodologies (experimental, applied and theoretical). Study skills necessary to successfully find/solve significant research problems. Finding and successful interacting with a research adviser. Ethical issues in research/collaborative work. (S/U grading only.)—F. (F) Nitta

**293B. Research in Computer Science (1)**

Lecture—1 hour. Prerequisite: graduate standing in computer science; graduate standing in computer science; 293A recommended. Pass One and Pass Two open to Graduate Students in Computer Science only. Study of Ph.D. level research methodologies (experimental, applied and theoretical), presenting research results for the computer science community. Study skills necessary to successfully find/solve significant research problems. (S/U grading only.)—W. (W) Martel

**298. Group Study (1-5)**

Lecture, laboratory, or combination. Prerequisite: consent of instructor. (S/U grading only.)

**299. Research (1-12)**

(S/U grading only.)

**Professional****390. The Teaching of Computer Science (1)**

Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in Pass One and Pass Two open to Graduate Students in Computer Science only. Computer Science Computer Science. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## Engineering: Electrical and Computer Engineering

(College of Engineering)

Kent Wilken, Ph.D., Chairperson of the Department

Soheil Ghiasi, Ph.D., Vice Chairperson for Undergraduate Studies

Rajeevan Amirtharajah, Ph.D., Vice Chairperson for Graduate Studies

**Department Office.** 2064 Kemper Hall  
530-752-0583; <http://www.ece.ucdavis.edu>

**Faculty**

Khaled Abdel-Ghaffar, Ph.D., Professor  
Venkatesh Akella, Ph.D., Professor  
Hussain Al-Asaad, Ph.D., Associate Professor  
Rajeevan Amirtharajah, Ph.D., Professor  
Bevan Baas, Ph.D., Professor  
G. R. Branner, Ph.D., Professor  
Srabanti Chowdhury, Ph.D., Associate Professor  
Chen-Nee Chugh, Ph.D., Professor  
Shuguang "Robert" Cui, Ph.D., Professor  
Zhi Ding, Ph.D., Professor  
Soheil Ghiasi, Ph.D., Associate Professor  
Q. Jane Gu, Ph.D., Associate Professor  
A. Nazli Gündes, Ph.D., Professor  
Joshua Hihath, Ph.D., Assistant Professor  
Charles E. Hunt, Ph.D., Professor  
Paul J. Hurst, Ph.D., Professor  
Saif Islam, Ph.D., Professor  
Andre Knoesen, Ph.D., Professor  
H. Brian Kolner, Ph.D., Professor  
Bernard C. Levy, Ph.D., Professor  
Stephen H. Lewis, Ph.D., Professor  
Xiaoguang "Leo" Liu, Ph.D., Assistant Professor  
Neville C. Luhmann, Jr., Ph.D., Professor  
Omeed Momeni, Ph.D., Assistant Professor  
John Owens, Ph.D., Professor  
Anh-Vu Pham, Ph.D., Professor  
Erkin Seker, Ph.D., Assistant Professor  
Kent Wilken, Ph.D., Professor  
Jerry M. Woodall, Ph.D., Professor  
S.J. Ben Yoo, Ph.D., Professor  
Qing Zhao, Ph.D., Professor

**Emeriti Faculty**

V. Ralph Algazi, Ph.D., Professor Emeritus  
Robert W. Bower, Ph.D., Professor Emeritus  
Tsu-Shuan Chang, Ph.D., Professor Emeritus  
John N. Churchill, Ph.D., Professor Emeritus  
Jean-Pierre Colinge, Ph.D., Professor Emeritus  
K. Wayne Current, Ph.D., Professor Emeritus  
Andrew J. Dienes, Ph.D., Professor Emeritus

Richard C. Dorf, Ph.D., Professor Emeritus

Herman J. Fink, Ph.D., Professor Emeritus

Gary E. Ford, Ph.D., Professor Emeritus

*Academic Senate Distinguished Teaching Award*

William A. Gardner, Ph.D., Professor Emeritus

Mohammed S. Ghausi, Ph.D., Professor Emeritus/

Dean Emeritus

Stephen Haley, Ph.D., Professor Emeritus

Jonathan P. Heritage, Ph.D., Professor Emeritus

T.C. Steve Hsia, Ph.D., Professor Emeritus

Vojin G. Oklobdzija, Ph.D., Professor Emeritus

G.R. Redinbo, Ph.D., Professor Emeritus

Ronald F. Soohoo, Ph.D., Professor Emeritus

Richard R. Spencer, Ph.D., Professor Emeritus

Shih-Ho Wang, Ph.D., Professor Emeritus

**Affiliated Faculty**

Shu Lin, Ph.D., Adjunct Professor

Augusto Sarti, Ph.D., Adjunct Professor

Diego Yankelevich, Ph.D., Adjunct Professor

### The Electrical and Computer Engineering Undergraduate Programs

The department administers two undergraduate curricula in the College of Engineering: (1) the Electrical Engineering curriculum and (2) the Computer Engineering curriculum.

**Integrated Degree Program (IDP).**

The IDP leads to both the Bachelor of Science and the Master of Science degrees. The program provides a student the opportunity to obtain superior breadth and depth of technical material. The IDP program in the Department of Electrical and Computer Engineering is available only to UC Davis undergraduates with strong academic records enrolled in the Electrical Engineering, Computer Engineering, Electronic Materials Engineering or Applied Physics curricula. Applicants in their junior year must apply for the IDP by March 31. For more information on IDP, see <http://www.ece.ucdavis.edu>.

**Mission.** Under its land grant status, the University of California has a mission to provide the state with the trained workforce it needs and to advance knowledge and research in directions that contribute to the general welfare of the state and the nation.

The Department of Electrical and Computer Engineering contributes to the mission of the University in three ways. First, its undergraduate and graduate education programs seek to provide students with an understanding of the fundamental principles of electrical and computer engineering, the skills needed to solve the complex technological problems of modern society and the ability to continue to learn and develop throughout their careers. Second, through its research programs, the department contributes to the development and progress of electronics, communications, and computer technology. Finally, the department helps to transfer research results to industry through publication, public service and professional activities.

**Objectives.** **Teaching**—To provide undergraduate students with sufficient breadth to allow them to participate in teams, continue their own education after graduation and select a focus area intelligently; to provide undergraduate students with sufficient depth in a narrower discipline to allow them to develop the ability to solve complex engineering problems; to educate the students in the graduate program to be leaders in industry or to do meaningful research in industry, government or academia. **Research**—To develop and maintain research programs that produce useful technological advances while simultaneously training the next generation of researchers and leaders; to update and/or shift the foci of these programs frequently in response to the needs of our constituency and the nation; to provide a stimulating environment that encourages our graduate students to develop their abilities as far as possible.

## Electrical Engineering Undergraduate Program

The Electrical Engineering program is accredited by the Engineering Accreditation Commission of ABET; see <http://www.abet.org>.

Electrical engineering involves the design, analysis, and effective use of electrical systems including electronic computers. Electrical systems and computers play a central role in nearly all aspects of modern life, including communication, medicine, education, environmental protection, space exploration, defense, and home entertainment.

Students who complete the Electrical Engineering curriculum will obtain a Bachelor of Science in Electrical Engineering, one of the engineering degrees recognized in all fifty states as eligible for registration as a Professional Engineer.

**Objectives.** The Electrical Engineering program has adopted the following objectives to serve the long-term interests of our students and the industries of Northern California and the nation. *Foundation*—To provide our graduates with a solid foundation in engineering science, including mathematics, physical science, and the fundamentals of electrical engineering. This foundation is necessary to succeed in more advanced engineering courses and to be able to continue learning throughout a career. *Breadth*—To provide our graduates the sufficient breadth in electrical engineering in order to understand engineering tradeoffs that cross disciplines, to contribute effectively to multidisciplinary projects and to make an informed decision about their area of specialization. *Depth*—To provide our graduates with sufficient depth in a specific area of electrical engineering necessary to solve complex real-world engineering problems and to contribute to a specific discipline within electrical engineering. *Ethics*—To provide our graduates with a basic understanding of, and ability to handle correctly, ethical problems that may arise during their careers. To provide them with an understanding of their obligations to society at large.

Exclusive of General Education units, the minimum number of units for the Electrical Engineering major is 146.

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

### Lower Division Required Courses

	UNITS
Mathematics 21A-21B-21C-21D	16
Mathematics 22A-22B	6
Physics 9A-9B-9C-9D	19
Chemistry 2A	5
Computer Science Engineering 30	4
Engineering 6, 17	8
Electrical and Computer Engineering 1, 10	5
(Electrical and Computer Engineering 10 is designed for sophomore students and is not recommended for upper-division students. Transfer and change of major students who do not take Electrical and Computer Engineering 10 will substitute four additional units of upper-division electives.)	
English 3 or University Writing Program 1, 1Y or 1V or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5 (grade of C- or better required)	4
Communication 1 or 3	4

### Upper Division Requirements:

#### Electrical Engineering Curriculum

##### Areas of Specialization

For updated recommended courses, see the department website at <http://www.ece.ucdavis.edu/undergrad/undergradhandbook.html>.

**Physical Electronics:** solid-state devices, circuits and fabrication and the theory courses supporting those subjects.

##### Recommended elective courses:

**Core electives:** Electrical and Computer Engineering 130B, 140B  
**Design Electives with Lab:** Electrical and Computer Engineering 118, or 132A, 132B or 135. Select remaining upper-division design electives from Electrical and Computer Engineering 110B, 146A, 146B  
**Technical electives:** Electrical and Computer Engineering 112, 180B

**Suggested Advisers.** S. Chowdhury, E. Seker, J. Hihath, C.E. Hunt, S. Islam, J.M. Woodall

**Electromagnetics:** microwave circuits and systems, and fiber optical systems.

##### Recommended elective courses:

**Core electives:** Electrical and Computer Engineering 130B, 140B  
**Design Electives with Lab:** Electrical and Computer Engineering 132A, 132B. Select remaining upper division design electives from Electrical and Computer Engineering 110B, 132C, 135

**Technical electives:** Select from Electrical and Computer Engineering 112 and 133

**Suggested Advisers.** G.R. Branner, A. Knoesen, X. Liu, N. Luhmann, O. Momeni, A. Pham, B. Yoo

**Analog Electronics:** transistor- and system-level analog circuit design.

##### Recommended elective courses:

**Core electives:** Electrical and Computer Engineering 110B, 140B, 150B  
**Design Electives with Lab:** at least two from Electrical and Computer Engineering 112, 157A, 165, 195A-195B

Select remaining upper division design electives from Electrical and Computer Engineering 118, 132A, 132B, 132C, 157B, 160, 210

**Technical electives:** Select from Electrical and Computer Engineering 130B, 146A

**Suggested Advisers.** R. Amirtharajah, Q.J. Gu, P.J. Hurst, S.H. Lewis, O. Momeni

**Digital Electronics:** transistor- and system-level digital circuit design.

##### Recommended elective courses:

**Core electives:** Electrical and Computer Engineering 110B, 140B, 150B  
**Design Electives with Lab:** Electrical and Computer Engineering 118 and 180B or 172 or 183 or 195A-195B

Select remaining upper division design electives from Electrical and Computer Engineering 116, 170 or 171

**Technical electives:** Select from Electrical and Computer Engineering 130B and 112 or 146A or 157A or 160 or 210

**Suggested Advisers.** R. Amirtharajah, P.J. Hurst, S.H. Lewis

**Communication Controls and Signal Processing:** digital communication, robotics, classical controls and communication, wireless and cellular digital communication systems, signal and image processing, and computer vision.

##### Recommended elective courses:

**Core electives:** Electrical and Computer Engineering, 150B, 180B

**Design Electives with lab:** Electrical and Computer Engineering 157A and 157B or 165

Select remaining upper division design electives from Electrical and Computer Engineering ..... 160

**Technical Electives:** select from Electrical and Computer Engineering 112, 195A-195B

**Suggested Advisers.** S. Cui, Z. Ding, A.N. Gündes, B.C. Levy, Q. Zhao

### Upper Division Required Courses

Electrical and Computer Engineering 100, 110A, 130A, 140A, 150A, 161, 180A, 196 ..... 31  
 Engineering 160, 190 or Computer Science Engineering 188 ..... 34  
 Upper-division electives\*\*\* ..... 32  
 Choose at least eight courses for a minimum of 32 units from the following:

**Two core electives:** Electrical and Computer Engineering 110B\*, 130B, 140B, 170, 180B\*, one from 150B, 157A\*, or 160  
**Design laboratory electives:** At least two design electives with lab: Electrical and Computer Engineering 110B, 112, 116, 118, 132A, 132B, 132C, 135, 146A, 146B, 152, 157A, 157B, 165, 172, 180B, 183

**At least one design project course\*\*:**  
 Electrical and Computer Engineering 119AB, 134AB, 136AB, 181AB, 193AB, 195AB;

The remaining electives may be any letter-graded upper division Electrical and Computer Engineering course not used to satisfy another major requirement; Computer Science and Engineering 40, 150, 152B, 163, 175, 177, or 178

**Technical electives\*\*\*** ..... 9

Chemistry 2B, 2C and any upper-division course except Chemistry 195 & 197  
 Engineering 35, 45, and any upper-division engineering course not used in satisfaction of core degree requirements, excluding Engineering 100, 160, 190 (each restricted to one unit of technical elective), 198, Computer Science Engineering 132, 155, 157, 188, 154A, & 154B (ECS 154AB courses may be used by EEE majors who did not take EEC 170). A maximum of 6 units for any combination of engineering courses numbered 190C, 192, 198, and 199 may be used.

**Mathematics:** any upper-division course except Mathematics 135A & 197C

**Physics:** any upper-division course except 116, 137, 160 (restricted to one unit of technical elective), 195, 197T

**Statistics:** any upper-division course except Statistics 100, 102, 103, 104, 106, 108, 120, 130A

**Biological Sciences 101, 101D, 102, 103, 104, 120, 120P, 122, 122P, 132**  
**Economics 100, 101, 102, 103, 122, 140**  
**Management 11A, 11B, 100, 120, 140, 150, 160, 170, 180**

**Upper Division Composition Requirement:**  
 One course from the following (a grade of C- or better is required): University Writing Program 101, 102A-L, 104A-T or passing the Upper Division Composition Exam .... 0 or 4

\* Maximum of one course appearing on both the core elective list and the design elective list may be counted in both categories.

\*\* All design project courses are also considered design lab courses and may be counted in both categories simultaneously.

\*\*\* After completion of the upper division elective requirement (at least 8 courses, 2 core, 2 with labs, 1 project) any units in excess of 32 will count toward the technical elective requirement.

## Computer Engineering Undergraduate Program

The Computer Engineering program is accredited by the Engineering Accreditation Commission of ABET; see <http://www.abet.org>.

Exclusive of General Education units, the minimum number of units required for the Computer Engineering undergraduate major is 148.

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is auth-

rized to drop students from a course for which stated prerequisites have not been completed.

#### Lower Division Required Courses

	UNITS
Mathematics 21A-21B-21C-21D .....	16
Mathematics 22A-22AL-22B .....	7
Physics 9A-9B-9C-9D .....	19
Chemistry 2A.....	5
Computer Science Engineering 20, 30, 40, 60.....	16
Electrical and Computer Engineering 1, 10.....	5
(Electrical and Computer Engineering 10 is designed for sophomore students and is not recommended for upper-division students. Transfer and change of major students who do not take Electrical and Computer Engineering 10 will substitute four additional units of upper-division electives.)	
Engineering 17 .....	4
English 3 or University Writing Program 1, 1Y or 1V or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5 (grade of C- or better) .....	4
Communication 1 or 3 .....	4

#### Upper Division Required Courses

Electrical and Computer Engineering 100, 110A, 140A, 161, 170, 172, 173A, 180A, 180B, 196.....	40
Computer Science Engineering 122A, 150.....	8
Engineering 160, 190, or Computer Science Engineering 188 .....	3-4
Upper-Division Elective Courses: .....	9-11
One design project course: Electrical and Computer Engineering 119AB, 134AB, 136AB, 181AB, 193AB, 195AB	
One upper division Electrical and Computer Engineering or Computer Science course (excluding Computer Science 132, 155, 157, 188, 154A, & 154B).	
Technical electives .....	8
Chemistry 2B, 2C and any upper-division course except Chemistry 195 & 197.	
Engineering 35, 45, and any upper- division engineering course not used in satisfaction of core degree requirements, excluding Engineering 100, 160, 190 (each restricted to one unit of technical elective), 198, Computer Science Engineering 132, 155, 157, 188, 154A, 154B. A maximum of 6 units for any combination of engineering courses numbered 190C, 192, 198, and 199 may be used.	
Mathematics: any upper-division course except Mathematics 135A & 197TC	
Physics: any upper-division course except 116, 137, 160 (restricted to one unit of technical elective), 195, 197T	
Statistics: any upper-division course except Statistics 100, 102, 103, 104, 106, 108, 120, 130A	
Biological Sciences 101, 101D, 102, 103, 104, 120, 120P, 122, 122P, 132	
Economics 100, 101, 102, 103, 122, 140	
Management 11A, 11B, 100, 120, 140, 150, 160, 170, 180	
Upper Division Composition Requirement.....	0 or 4
One course from the following (a grade of C- or better is required): University Writing Program 101, 102A-L, 104A-T or passing the Upper Division Composition Exam.	

#### Electrical Engineering Minor

There has been an increasing need for professionals in most engineering disciplines to understand the fundamentals of electronic circuits, electronic signals, semiconductor devices, applied electromagnetics, control systems, computer systems, and communication systems.

The objective of this minor program is to prepare students with the necessary theoretical and practical

training in one or many of the above mentioned fields. The minor program curriculum is designed to allow flexibility while ensuring a solid foundation of fundamental electrical engineering concepts. The program is expected to accommodate students of diverse backgrounds.

The minor must be outside the department or program of your major and no more than one course may be counted toward both your minor and your major. The courses you take to satisfy the requirements of a minor, including those completed elsewhere, must be approved by an adviser in the Department of Electrical and Computer Engineering. You must have a minimum overall GPA of 2.000 and satisfy the minor course requirements, listed below. To receive notation of this minor on your diploma, you must obtain a minor petition and file it no later than the deadline for filing for graduation.

#### Minor Requirements

	UNITS
Electrical Engineering .....	21

Electrical and Computer Engineering 100.....	5
At least one of the following combinations:	
<i>Analog circuits</i> : Electrical and Computer Engineering 110A and 110B	
<i>Electromagnetics</i> : Electrical and Computer Engineering 130A and 130 B	
<i>Physical Electronics</i> : Electrical and Computer Engineering 140A and 140B	
<i>Signals and Systems</i> : Electrical and Computer Engineering 150A and 150B	
<i>Communication</i> : Electrical and Computer Engineering 150A and 160	
<i>Control Systems</i> : Electrical and Computer Engineering 150A and 157A	
<i>Digital Systems</i> : Electrical and Computer Engineering 180A and 180B .....	8-10
At least 8 additional units of Electrical and Computer Engineering courses numbered 101 or above, except for Electrical and Computer Engineering 190, 192, 196, 197, 198, 199, 298, 299, 390, and 396. (If you elect to do a design project, you must be registered for both quarters).....	8-10

**Minor Advisers.** Z. Ding, X. Liu

#### The Graduate Program in Electrical and Computer Engineering

M.S. and Ph.D.  
<http://www.ece.ucdavis.edu>  
530-752-8251

The Department of Electrical and Computer Engineering prepares graduate students to do meaningful research and acquire skills and insights vital to solving some of the world's most complex technological problems. Our graduate program offers a challenging and stimulating environment, covering optical, wireline and wireless communications, telecommunication networks, computer engineering, circuits, electromagnetics, physical electronics, optoelectronics, control, and signal processing. The depth of resources in the study of circuit design alone, with one of the largest faculty groups in the field in the UC system, distinguishes us from other programs, while our program in microwave communications and devices is unique.

The Electrical and Computer Engineering Graduate Program benefits from the highly interdisciplinary culture at UC Davis and attracts faculty from biomedical, chemical, electrical, computer, civil, and mechanical engineering, as well as computer science and mathematics.

Many of our graduates go on to leadership and technology management roles in industry, returning each year for our industrial affiliates meeting to network with other industry representatives, current students and faculty.

Generous financial support is available in the form of research assistantships, teaching assistantships, fellowships and financial aid.

#### Research Highlights:

- Communications, control, networking, and signal processing
- Computer engineering
- Electronic circuits
- Optoelectronics
- RF, micro- and millimeter waves
- Physical electronics

#### Research Facilities and Partnerships:

- Center for Information Technology in the Interest of Society
  - Northern California Center for Nanotechnology
  - Center on Polymer Interfaces and Macromolecular Assemblies
  - Lawrence Livermore National Laboratory
  - Lawrence Berkeley National Laboratory
  - Los Alamos National Laboratory
  - California Lighting Technology Center
  - PlanetLab Consortium
  - Sandia National Laboratory
- Complete Information on our website.

#### Courses in Engineering: Electrical and Computer Engineering (EEC)

##### Lower Division

###### 1. Introduction to Electrical and Computer Engineering (1)

Lecture—1 hour. Electrical and Computer Engineering as a professional activity. What Electrical and Computer Engineers know and how they use their knowledge. (P/NP grading only.) GE credit: SE.—F. (F.)

###### 10. Introduction to Digital and Analog Systems (3)

Lecture—1 hour; laboratory—3 hours. Prerequisite: Computer Science Engineering 30, and Physics 9C or 9HD (may be taken concurrently); consent of instructor. Open to Electrical and Computer Engineering sophomores. Interactive and practical introduction to fundamental concepts of electrical and computer engineering by implementing electronic systems, which can be digitally controlled and interrogated, with a programmable microcontroller with the ability to program the electrical connections between analog and digital components. GE credit: SciEng | SE.—W, S. (W, S.)

###### 70. Computer Structure and Assembly Language (4)

Lecture—3 hours; workshop—1 hour. Prerequisite: Computer Science Engineering 30. Computer architecture; machine language; assembly language; macros and conditional macros; subroutine/parameter passing; input-output programming, interrupt and trap; direct-memory-access; absolute and relocatable code; re-entrant code; program development in an operating system. Only one unit of credit to students who have completed Computer Science Engineering 50. GE credit: SciEng | SE.

###### 89A. Special Topics in Electromagnetics (1-5)

Prerequisite: consent of instructor. Special topic in Electromagnetics. May be repeated for credit if topic differs. Offered irregularly. GE credit: SciEng | SE.

###### 89B. Special Topics in Physical Electronics (1-5)

Prerequisite: consent of instructor. Special topic in Physical Electronics. May be repeated for credit if topic differs. Offered irregularly. GE credit: SciEng | SE.

###### 89C. Special Topics in Active and Passive Circuits (1-5)

Prerequisite: consent of instructor. Special topic in Active and Passive Circuits. May be repeated for credit if topic differs. Offered irregularly. GE credit: SciEng | SE.

**89D. Special Topics in Signals and Systems (1-5)**

Prerequisite: consent of instructor. Special topics in Signals and Systems. May be repeated for credit if topic differs. Offered irregularly. GE credit: SciEng | SE.

**89E. Special Topics in Computer Systems and Software (1-5)**

Prerequisite: consent of instructor. Special topics in Computer Systems and Software. May be repeated for credit if topic differs. Offered irregularly. GE credit: SciEng | SE.

**89F. Special Topics in Digital System Design (1-5)**

Prerequisite: consent of instructor. Special topics in Digital System Design. May be repeated for credit if topic differs. Offered irregularly. GE credit: SciEng | SE.

**90C. Research Group Conference in Electrical and Computer Engineering (1)**

Discussion—1 hour. Prerequisite: consent of instructor; lower division standing. Research group conferences. May be repeated for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

**90X. Lower Division Seminar (1-4)**

Seminar—1-4 hours. Prerequisite: consent of instructor. Examination of a special topic in a small group setting. May be repeated for credit.

**92. Internship in Electrical and Computer Engineering (1-5)**

Internship—3-15 hours. Prerequisite: lower division standing; project approval prior to period of internship. Supervised work experience in Electrical and Computer Engineering. May be repeated for credit. (P/NP grading only.)

**98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Lower Division Students (1-5)**

(P/NP grading only.)

**Upper Division****100. Circuits II (5)**

Laboratory—3 hours; lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 17, C or better. Restricted to the following majors: Electrical Engineering, Computer Engineering, Computer Science & Engineering, Electronic Materials Engineering, Electrical Engineering/Materials Science, Optical Science & Engineering, Biomedical Engineering, Applied Physics, Electrical & Computer Engineering graduate students. Theory, application, and design of analog circuits. Methods of analysis including frequency response, SPICE simulation, and Laplace transform. Operational amplifiers and design of active filters. Students who have completed Engineering 100 may receive 3.5 units of credit. GE credit: SciEng | QL, SE, VL.—F, W. (F, W.)

**110A. Electronic Circuits I (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100; course 140A recommended. Use and modeling of nonlinear solid-state electronic devices in basic analog and digital circuits. Introduction to the design of transistor amplifiers and logic gates. GE credit: SciEng | SE, VL.—W, S. (W, S.)

**110B. Electronic Circuits II (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 110A. Analysis and design of integrated circuits. Single-stage amplifiers, cascaded amplifier stages, differential amplifiers, current sources, frequency response, and return-ratio analysis of feedback amplifiers. GE credit: SciEng | SE, VL.—S. (S.)

**112. Communication Electronics (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 110A and 150A; course 110B recommended. Electronic circuits for analog and digital communication, including oscillators, mixers, tuned amplifiers, modulators, demodulators, and phase-

locked loops. Circuits for amplitude modulation (AM) and frequency modulation (FM) are emphasized. GE credit: SciEng | SE.—W. (W.)

**116. VLSI Design (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 110A; course 180A recommended. CMOS devices, layout, circuits, and functional units; VLSI fabrication and design methodologies. GE credit: SciEng | SE.—F. (F.)

**118. Digital Integrated Circuits (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 110A, 180A. Analysis and design of digital integrated circuits. Emphasis on MOS logic circuit families. Logic gate construction, voltage transfer characteristics, propagation delay, and power consumption. Regenerative circuits, sequential elements, interconnect, RAMs, ROMs, and PLAs. GE credit: SciEng | SE.—S. (S.)

**119A. Integrated Circuit Design Project (3)**

Workshop—1 hour; laboratory—6 hours. Prerequisite: course 116 or 118. Design course involving architecture, circuit design, physical design, and validation through extensive simulation of a digital or mixed-signal integrated circuit of substantial complexity under given design constraints. Team project that includes a final report. (Deferred grading only, pending completion of sequence.) GE credit:

SciEng | SE.—W. (W.)

**119B. Integrated Circuit Design Project (3)**

Workshop—1 hour; laboratory—6 hours. Prerequisite: course 119A. Design course involving architecture, circuit design, physical design, and validation through extensive simulation of a digital or mixed-signal integrated circuit of substantial complexity under given design constraints. Team project that includes a final report. (Deferred grading only, pending completion of sequence.) GE credit:

SciEng | SE.—S. (S.)

**130A. Electromagnetics I (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21D; Physics 9C or 9HD, Engineering 17. Basics of static electric and magnetic fields and fields in materials. Work and scalar potential. Maxwell's equations in integral and differential form. Plan waves in lossless media. Lossless transmission lines. GE credit: SciEng | SE.—F, W. (F, W.)

**130B. Introductory Electromagnetics II (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 130A. Plane wave propagation in lossy media, reflections, guided waves, simple modulated waves and dispersion, and basic antennas. GE credit: SciEng | SE.—S. (S.)

**132A. RF and Microwaves in Wireless Communication (5)**

Lecture—3 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 110A, 130B. Study of Radio Frequency and Microwave theory and practice for design of wireless electronic systems. Transmission lines, microwave integrated circuits, circuit analysis of electromagnetic energy transfer systems, the scattering parameters. GE credit: SciEng | SE.—F. (F.)

**132B. RF and Microwaves in Wireless Communication (5)**

Lecture—3 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 132A. Passive RF and microwave device analysis, design, fabrication, and testing for wireless applications. RF and microwave filter and coupler design. Introductory analysis and design of RF and microwave transistor amplifiers. GE credit: SciEng | SE.—W. (W.)

**132C. RF and Microwaves in Wireless Communications (5)**

Lecture—3 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 132B. RF and microwave amplifier theory and design, including transistor circuit models, stability considerations, noise models and low noise design. Theory and design of microwave transistor oscillators and mixers. Wireless system design and analysis. GE credit: SciEng | SE.—S. (S.)

**133. Electromagnetic Radiation and Antenna Analysis (4)**

Lecture—3 hours; discussion—1 hour. Prerequisites: course 130B. Properties of electromagnetic radiation; analysis and design of antennas: ideal cylindrical, small loop, aperture, and arrays; antenna field measurements. GE credit: SciEng | SE.—F. (F.)

**134A. RF/Microwave Systems Design (3)**

Workshop—3 hours; laboratory—6 hours. Prerequisites: course 130B or 110B or 150A. Class size limited to 24 students. Board-level RF design, fabrication, and characterization of an RF/microwave system, including the antenna, RF front-end, baseband, mix-signal circuits, and digital signal processing models. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | SE.—F. (F.)

**134B. RF/Microwave Systems Design (3)**

Workshop—3 hours; laboratory—6 hours. Prerequisites: course 134A. Class size limited to 24 students. Board-level RF design, fabrication, and characterization of an RF/microwave system, including the antenna, RF front-end, baseband, mix-signal circuits, and digital signal processing models. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | SE.—W. (W.)

**135. Optical Communications I: Fibers (4)**

Lecture—4 hours. Prerequisite: course 130B. Principles of optical communication systems. Planar dielectric waveguides. Optical fibers: single-mode, multi-mode, step and graded index. Attenuation and dispersion in optical fibers. Optical sources (LEDs and lasers) and receivers. Design of digital optical transmission systems. GE credit: SciEng | SE.—W. (W.)

**136A. Electronic Design Project (3)**

Workshop—1 hour; laboratory—6 hours. Prerequisite: Computer Science Engineering 30; courses 100, 180A; and either 110B, 157A (may be taken concurrently), or 180B. Pass One restricted to major. Optical, electronic and communication-engineering design of an opto-electronic system operating under performance and economic constraints. Measurement techniques will be designed and implemented, and the system will be characterized. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | SE.—F. (F.)

**136B. Electronic Design Project (3)**

Workshop—1 hour; laboratory—6 hours. Prerequisite: course 136A. Optical, electronic and communication-engineering design of an opto-electronic system operating under performance and economic constraints. Measurement techniques will be designed and implemented, and the system will be characterized. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | SE.—W. (W.)

**140A. Principles of Device Physics I (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 17; Physics 9D or 9HE. Semiconductor device fundamentals, equilibrium and non-equilibrium statistical mechanics, conductivity, diffusion, electrons and holes, p-n and Schottky junctions, first-order metal-oxide-semiconductor (MOS) field effect transistors, bipolar junction transistor fundamentals. GE credit: SE, SL.—F, W. (F, W.)

**140B. Principles of Device Physics II (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 140A. Electrical properties, designs, models and advanced concepts for MOS, Bipolar, and Junction Field-Effect Transistors, including scaling, minority-carrier distributions, non-ideal effects, and device fabrication methods. MESFET and heterojunction bipolar transistors (HBTs). Fundamentals of solar cells, photodetectors, LEDs and semiconductor lasers. GE credit: SciEng | SE.—S. (S.)

**145. Electronic Materials (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 140A. Electronic and physical properties of materials used in electronics, ICs, optoelectronics and MEMS. Semiconductors, dielectrics, metals, optical materials, organic semiconductive, optical

and nonlinear properties, as well as their synthesis and deposition methods. GE credit: SciEng | SE. —W. (W.)

#### **146A. Integrated Circuits Fabrication (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 140A. Basic fabrication processes for Metal Oxide Semiconductor (MOS) integrated circuits. Laboratory assignments covering oxidation, photolithography, impurity diffusion, metallization, wet chemical etching, and characterization work together in producing metal-gate PMOS test chips which will undergo parametric and functional testing. GE credit: SciEng | SE. —F. (F.)

#### **146B. Advanced Integrated Circuits Fabrication (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 146A. Restricted to Electrical, Computer, and Electrical/Materials Science majors and Electrical Engineering graduate students; non-majors accommodated when space available. Fabrication processes for CMOS VLSI. Laboratory projects examine deposition of thin films, ion implantation, process simulation, anisotropic plasma etching, sputter metallization, and C-V analysis. Topics include isolation, projection alignment, epilayer growth, thin gate oxidation, and rapid thermal annealing. Offered in alternate years. GE credit: SciEng | SE. —W. (W.)

#### **150A. Introduction to Signals and Systems I (4)**

Lecture—4 hours. Prerequisite: Engineering 6 or Mathematics 22AL (may be taken concurrently); course 100. Characterization and analysis of continuous-time linear systems. Fourier series and transforms with applications. Introduction to communication systems. Transfer functions and block diagrams. Elements of feedback systems. Stability of linear systems. GE credit: SciEng | QL, SE. —W, S. (W, S.)

#### **150B. Introduction to Signals and Systems II (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 150A. Characterization and analysis of discrete time systems. Difference equation models. Z-transform analysis methods. Discrete and fast Fourier transforms. Introduction to digital filter design. GE credit: SciEng | QL, SE. —F. (F.)

#### **152. Digital Signal Processing (4)**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 150B; course 70 or Computer Science Engineering 50. Theory and practice of real-time digital signal processing. Fundamentals of real-time systems. Programmable architectures including I/O, memory, peripherals, interrupts, DMA. Interfacing issues with A/D and D/A converters to a programmable DSP. Specification driven design and implementation of simple DSP applications. GE credit: SciEng | SE. —S. (S.)

#### **157A. Control Systems (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100. Analysis and design of feedback control systems. Examples are drawn from electrical and mechanical systems as well as other engineering fields. Mathematical modeling of systems, stability criteria, root-locus and frequency domain design methods. GE credit: SciEng | SE. —F. (F.)

#### **157B. Control Systems (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 157A. Control system design; transfer-function and state-space methods; sampled-data implementation, digital control. Laboratory includes feedback system experiments and simulation studies. GE credit: SciEng | SE. —W. (W.)

#### **160. Signal Analysis and Communications (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 150A. Signal analysis based on Fourier methods. Fourier series and transforms; time-sampling, convolution, and filtering; spectral density; modulation: carrier-amplitude, carrier-frequency, and pulse-amplitude. GE credit: SE. —F. (F.)

#### **161. Probabilistic Analysis of Electrical & Computer Systems (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100; Engineering 6 or Mathematics 22AL. Probabilistic and statistical analysis of electrical and computer systems. Discrete and continuous random variables, expectation and moments. Transformation of random variables. Joint and conditional densities. Limit theorems and statistics. Noise models, system reliability and testing. GE credit: SciEng | SE. —F, S. (F, S.)

#### **165. Statistical and Digital Communication (4)**

Lecture—3 hours; project—3 hours. Prerequisite: course 160, 161. Introduction to random process models of modulated signals and noise, and analysis of receiver performance. Analog and digitally modulated signals. Signal-to-noise ratio, probability of error, matched filters. Intersymbol interference, pulse shaping and equalization. Carrier and clock synchronization. GE credit: SciEng | SE. —W. (W.)

#### **170. Introduction to Computer Architecture (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 180A, Computer Science Engineering 30. Introduces basic aspects of computer architecture, including computer performance measurement, instruction set design, computer arithmetic, pipelined/non-pipelined implementation, and memory hierarchies (cache and virtual memory). Presents a simplified Reduced Instruction Set Computer using logic design methods from the prerequisite course. GE credit: SciEng | SE. —F. (F.)

#### **171. Parallel Computer Architecture (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 170 or Computer Science Engineering 154B. Organization and design of parallel processors including shared memory multiprocessors, cache coherence, memory consistency, snooping protocols, synchronization, scalable multiprocessors, message passing protocols, distributed shared memory and interconnection networks. GE credit: SciEng | SE. —S. (S.)

#### **172. Embedded Systems (4)**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 100; and course 170 or Computer Science Engineering 154A. Introduction to embedded-system hardware and software. Topics include: embedded processor and memory architecture; input/output hardware and software, including interrupts and direct memory access; interfacing with sensors and actuators; wired and wireless embedded networking. GE credit: SciEng | SE. —W, S. (W, S.)

#### **173A. Computer Networks (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Computer Science Engineering 60; Computer Science and Engineering 132 or Electrical and Computer Engineering 161 or Mathematics 135A or Statistics 131A, or Statistics 120 or Statistics 32. Pass One open to Computer Science, Computer Science Engineering and Computer Engineering Majors only. Overview of computer networks, TCP/IP protocol suite, computer-networking applications and protocols, transport-layer protocols, network architectures, Internet Protocol (IP), routing, link-layer protocols, local area and wireless networks, medium access control, physical aspects of data transmission, and network-performance analysis. Only 2 units of credit for students who have taken course 157. (Same course as Computer Science Engineering 152A.) GE credit: SciEng | SE. —F, W, S. (F, W, S.) Chuah, Ghosal, Liu, Matloff, Mohapatra, Mukherjee

#### **173B. Design Projects in Communication Networks (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 173A or Computer Science and Engineering 152A. Advanced topics and design projects in communication networks. Example topics include wireless networks, multimedia networking, network

design and management, traffic analysis and modeling, network simulations and performance analysis. (Same course as Computer Science Engineering 152C.) Offered in alternate years. GE credit: SciEng | SE. —S. (S.)

#### **180A. Digital Systems I (5)**

Lecture—3 hours; laboratory—6 hours. Prerequisite: Physics 9C or 9HD. Introduction to digital system design including combinational logic design, sequential and asynchronous circuits, computer arithmetic, memory systems and algorithmic state machine design; computer aided design (CAD) methodologies and tools. GE credit: SciEng | SE. —F, W. (F, W.)

#### **180B. Digital Systems II (5)**

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 180A. Computer-aided design of digital systems with emphasis on hardware description languages (VHDL), logic synthesis, and field-programmable gate arrays (FPGA). May cover advanced topics in digital system design such as static timing analysis, pipelining, memory system design, testing digital circuits. GE credit: SciEng | SE. —S. (S.)

#### **181A. Digital Systems Design Project (3)**

Workshop—1 hour; laboratory—6 hours. Prerequisite: courses 180B and either course 170 or Computer Science 122A. Digital-system and computer-engineering design course involving architecture, design, implementation and testing of a prototype application-specific processor under given design constraints. This is a team project that includes a final presentation and report. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | SE. —W. (W.)

#### **181B. Digital Systems Design Project (3)**

Workshop—1 hour; laboratory—6 hours. Prerequisite: course 181A. Digital-system and computer-engineering design course involving architecture, design, implementation and testing of a prototype application-specific processor under given design constraints. This is a team project that includes a final presentation and report. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | SE. —S. (S.)

#### **183. Testing and Verification of Digital Systems (5)**

Lecture—3 hours; laboratory—4 hours. Prerequisite: courses 170 and 180B. Computer aided-testing and design verification techniques for digital systems; physical fault testing; simulation-based design verification; formal verification; timing analysis. GE credit: SciEng | SE. —W. (W.)

#### **189A. Special Topics in Electrical Engineering and Computer Science; Computer Science (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topic in Computer Science. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE. —F, W, S. (F, W, S.)

#### **189B. Special Topics in Electrical Engineering and Computer Science; Programming Systems (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Programming Systems. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE. —F, W, S. (F, W, S.)

#### **189C. Special Topics in Electrical Engineering and Computer Science; Digital Systems (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Digital Systems. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE. —F, W, S. (F, W, S.)

**189D. Special Topics in Electrical Engineering and Computer Science; Communications (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Communications. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189E. Special Topics in Electrical Engineering and Computer Science; Signal Transmission (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Signal Transmission. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189F. Special Topics in Electrical Engineering and Computer Science; Digital Communication (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Digital Communication. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189G. Special Topics in Electrical Engineering and Computer Science; Control Systems (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Control Systems. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189H. Special Topics in Electrical Engineering and Computer Science; Robotics (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Robotics. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189I. Special Topics in Electrical Engineering and Computer Science; Signal Processing (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Signal Processing. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189J. Special Topics in Electrical Engineering and Computer Science; Image Processing (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Image Processing. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189K. Special Topics in Electrical Engineering and Computer Science; High-Frequency Phenomena and Devices (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in High-Frequency Phenomena and Devices. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189L. Special Topics in Electrical Engineering and Computer Science; Solid-State Devices and Physical Electronics (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Solid-State Devices and Physical Electronics. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189M. Special Topics in Electrical Engineering and Computer Science; Systems Theory (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Systems Theory. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189N. Special Topics in Electrical Engineering and Computer Science; Active and Passive Circuits (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Active and Passive Circuits. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189O. Special Topics in Electrical Engineering and Computer Science; Integrated Circuits (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Integrated Circuits. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189P. Special Topics in Electrical Engineering and Computer Science; Computer Software (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Computer Software. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189Q. Special Topics in Electrical Engineering and Computer Science; Computer Engineering (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Computer Engineering. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189R. Special Topics in Electrical Engineering and Computer Science; Microprocessing (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Microprocessing. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189S. Special Topics in Electrical Engineering and Computer Science; Electronics (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Electronics. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189T. Special Topics in Electrical Engineering and Computer Science; Electromagnetics (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Electromagnetics. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189U. Special Topics in Electrical Engineering and Computer Science; Opto-Electronics (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Opto-Electronics. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**189V. Special Topics in Electrical Engineering and Computer Science; Computer Networks (1-5)**

Lecture; laboratory; lecture/laboratory. Prerequisite: consent of instructor. Special topics in Computer Networks. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**190C. Research Group Conferences in Electrical and Computer Engineering (1)**

Discussion—1 hour. Prerequisite: upper division standing in Electrical and Computer Engineering; consent of instructor. Research group conferences. May be repeated for credit. (P/NP grading only.) GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**192. Internship in Electrical and Computer Engineering (1-5)**

Internship—3-15 hours. Prerequisite: completion of a minimum of 84 units; project approval before period of internship; consent of instructor. Supervised work experience in electrical and computer engineering. May be repeated for credit if project is different. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

**193A. Senior Design Project (3)**

Workshop—1 hour; laboratory—6 hours. Prerequisite: course 196 (may be taken concurrently); consent of instructor. Restricted to senior standing in Electrical or Computer Engineering. Team design project for seniors in Electrical or Computer Engineering. Team design project for seniors in Electrical or Computer Engineering. Project involves analysis, design, implementation and evaluation of an Electrical Engineering or Computer Engineering system. Project is supervised by a faculty member. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | SE.—F, W, S. (F, W.)

**193B. Senior Design Project (3)**

Workshop—1 hour; laboratory—6 hours. Prerequisite: course 193A. Team design project for seniors in Electrical Engineering or Computer Engineering. Team design project for seniors in Electrical Engineering or Computer Engineering. Project involves analysis, design, implementation and evaluation of an Electrical Engineering or Computer Engineering system. Project supervised by a faculty member. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | SE.—W, S. (W, S.)

**195A. Autonomous Vehicle Design Project (3)**

Workshop—1 hour; laboratory—6 hours. Prerequisite: Computer Science and Engineering 30; course 180A; and either 110B, 157A (may be taken concurrently), 180B, or 60. Pass One restricted to major. Design and construct an autonomous race car. Work in groups to design, build and test speed control circuits, track sensing circuits, and a steering control loop. (Deferred grading only pending completion of sequence.) GE credit: SciEng | SE.—F, (F.)

**195B. Autonomous Vehicle Design Project (3)**

Workshop—1 hour; laboratory—6 hours. Prerequisite: course 195A. Design and construct an autonomous race car. Students work in groups to design, build and test speed control circuits, track sensing circuits, and a steering control loop. (Deferred grading only pending completion of sequence.) GE credit: SciEng | SE.—W, (W.)

**196. Issues in Engineering Design (1)**

Seminar—1 hour. Prerequisite: senior standing in Electrical or Computer Engineering. The course covers various electrical and computer engineering standards and realistic design constraints including economic, manufacturability, sustainability, ethical, health and safety, environmental, social, and political. GE credit: SciEng | SE.—F, (F.)

**197T. Tutoring in Electrical and Computer Engineering (1-3)**

Discussion—1 hour; discussion/laboratory—2-8 hours. Prerequisite: upper division standing; consent of instructor. Tutoring in Electrical and Computer Engineering courses, especially introductory circuits. For upper-division undergraduate students who will provide tutorial assistance. (P/NP grading only.)—F, W, S. (F, W, S.)

**198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. May be repeated three times for credit. (P/NP grading only.) GE credit: SE.

**199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate****201. Digital Signal Processing (4)**

Lecture—4 hours. Prerequisite: course 150B; Statistics 120 or Mathematics 131 or Mathematics 167 recommended. Theory and design of digital filters.

Classification of digital filters, linear phase systems, all-pass functions, FIR and IIR filter design methods and optimality measures, numerically robust structures for digital filters. —W. (W.)

### **202. Advanced Digital Signal Processing (4)**

Lecture—4 hours. Prerequisite: courses 201, 260, and 265, and Mathematics 167 are recommended. Multirate DSP theory and wavelets, optimal transform and subband coders in data compressions, advanced sampling theory and oversampled A/D converters, transmultiplexers and precoders in digital communication systems, genomic signal processing. Offered in alternate years.—(S.)

### **205. Computational Methods in Biomedical Imaging (4)**

Lecture—4 hours. Prerequisite: Biomedical Engineering 105 or Statistics 120; Biomedical Engineering 108 or course 150A. Analytic tomographic reconstruction from projections in 2D and 3D; model-based image reconstruction methods; maximum likelihood and Bayesian methods; applications to CT, PET, and SPECT. (Same course as Biomedical Engineering 252.) —W. (W.)

### **206. Digital Image Processing (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 150B. Two-dimensional systems theory, image perception, sampling and quantization, transform theory and applications, enhancement, filtering and restoration, image analysis, and image processing systems. —(W.)

### **210. MOS Analog Circuit Design (3)**

Lecture—3 hours. Prerequisite: course 140A and 110B. Analysis and design of MOS amplifiers, bias circuits, voltage references and other analog circuits. Stability and compensation of feedback amplifiers. Introduction to noise analysis in MOS circuits. —F. (F.)

### **211. Advanced Analog Circuit Design (3)**

Lecture—3 hours. Prerequisite: course 210; Statistics 131A and course 112 recommended. Noise and distortion in electronic circuits and systems. Application to communication circuits. Specific applications include mixers, low-noise amplifiers, power amplifiers, phase-locked loops, oscillators and receiver architectures. Offered in alternate years. —W. (W.)

### **212. Analog MOS IC Design for Signal Processing (3)**

Lecture—3 hours. Prerequisite: course 210. Analysis and design of analog MOS integrated circuits. Passive components, single-ended and fully differential op amps, sampled-data and continuous-time filters. —W. (W.)

### **213. Data-Conversion Techniques and Circuits (3)**

Lecture—3 hours. Prerequisite: course 210. Digital-to-analog and analog-to-digital conversion; component characteristics and matching; sample-and-hold, comparator, amplifier, and reference circuits. —S. (S.)

### **214. Computer-Aided Circuit Analysis and Design (3)**

Lecture—3 hours. Prerequisite: courses 110A, 110B and knowledge of FORTRAN or C. Network equation formulations. Nonlinear DC, linear AC, time-domain (both linear and nonlinear), steady-state (nonlinear) and harmonic analysis. DC, AC, and time-domain sensitivities of linear and nonlinear circuits. Gradient-based design optimization. Behavioral simulations. Extensive CAD project. —W. (W.)

### **215. Circuits for Digital Communications (3)**

Lecture—3 hours. Prerequisite: courses 150B and 210 (may be taken concurrently); course 165, 166 or 265 recommended. Analog, digital, and mixed-signal CMOS implementations of communication-circuit blocks; gain control, adaptive equalizers, sampling detectors, clock recovery. Offered in alternate years. —F.

### **216. Low Power Digital Integrated Circuit Design (3)**

Lecture—3 hours. Prerequisite: course 118. IC design for low power and energy consumption. Low power architectures, logic styles and circuit design.

Variable supply and threshold voltages. Leakage management. Power estimation. Energy sources, power electronics, and energy recovery. Applications in portable electronics and sensors. Thermodynamic limits. Offered in alternate years. —W. (W.)

### **217. Biomedical Electronics (4)**

Lecture—3 hours; project. Prerequisite: course 210 or consent of instructor; special consideration and accommodation will be made for biomedical or signal processing majors who have not taken 210. Circuit design for medical applications including weak inversion amplifiers; integrated ULF filters; chopper stabilization; electrochemical interfaces; neurostimulation pulse generation; wireless powering of and communication with implantable devices. Electrophysiological signaling and aspects of signal processing for biomedical systems. —S. (S.)

### **219. Advanced Digital Circuit Design (3)**

Lecture—3 hours. Prerequisite: course 118 or 218A. Analysis and design of digital circuits. Both bipolar and MOS circuits are covered. Dynamic and static RAM cells and sense amplifiers. Advanced MOS families. Multi-valued logic. —(S.)

### **221. Analog Filter Design (3)**

Lecture—3 hours. Prerequisite: courses 100 and 150A. Design of active and passive filters including filter specification and approximation theory. Passive LC filter design will cover doubly-terminated reactance two-port synthesis. Active filter design will include sensitivity, op-amp building blocks, cascade, multi-loop, ladder and active-R filter design. Offered in alternate years. —(F.)

### **222. RF IC Design (3)**

Lecture—3 hours. Prerequisite: course 132C and 210. Radio frequency (RF) solid-state devices, RF device modeling and design rules; non-linear RF circuit design techniques; use of non-linear computer-aided (CAD) tools; RF power amplifier design. Offered in alternate years. —(S.)

### **228. Advanced Microwave Circuit and Device Design Techniques (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 132B. Theory, design, fabrication, analysis of advanced microwave circuits and devices. Wideband transformers, stripline/microstripline broadband couplers. Lumped and distributed filter synthesis. Broadband matching theory applied to microwave devices. Wideband and low noise FET/HEMT amplifiers. Advanced microwave oscillator theory. Phase noise analysis. Offered in alternate years. —S. (S.)

### **229. RF-MEMS and Adaptive Wireless Frontends (4)**

Lecture—3 hours; discussion—3 hours. Prerequisite: course 130A. Focuses on the modeling, design, fabrication, and characterization of RF-MEMS while providing a thorough introduction to the technology with an emphasis on how it will benefit the design of adaptive RF/microwave wireless systems. Offered in alternate years. —S.

### **230. Electromagnetics (3)**

Lecture—3 hours. Prerequisite: course 130B. Maxwell's equations, plane waves, reflection and refraction, complex waves, waveguides, resonant cavities, and basic antennas. —F. (F.)

### **231A. Plasma Physics and Controlled Fusion (3)**

Lecture—3 hours. Prerequisite: consent of instructor. Equilibrium plasma properties; single particle motion; fluid equations; waves and instabilities in a fluid plasma; plasma kinetic theory and transport coefficients; linear and nonlinear Vlasov theory; fluctuations, correlations and radiation; inertial and magnetic confinement systems in controlled fusion. Offered in alternate years.

### **231B. Plasma Physics and Controlled Fusion (3)**

Lecture—3 hours. Prerequisite: course 231A; consent of instructor. Equilibrium plasma properties; single particle motion; fluid equations; waves and instabilities in a fluid plasma; plasma kinetic theory and transport coefficients; linear and nonlinear

Vlasov theory; fluctuations, correlations and radiation; inertial and magnetic confinement systems in controlled fusion. Offered in alternate years. —(W.)

### **231C. Plasma Physics and Controlled Fusion (3)**

Lecture—3 hours. Prerequisite: course 231B; consent of instructor. Equilibrium plasma properties; single particle motion; fluid equations; waves and instabilities in a fluid plasma; plasma kinetic theory and transport coefficients; linear and nonlinear Vlasov theory; fluctuations, correlations and radiation; inertial and magnetic confinement systems in controlled fusion. Offered in alternate years. —(S.)

### **232A. Advanced Applied Electromagnetics I (3)**

Lecture—3 hours. Prerequisite: course 132B. The exact formulation of applied electromagnetic problems using Green's functions. Applications of these techniques to transmission circuits. Offered in alternate years. —W. (W.)

### **232B. Advanced Applied Electromagnetics II (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 132B. Advanced treatment of electromagnetics with applications to passive microwave devices and antennas. Offered in alternate years. —S. (S.)

### **233. High Speed Signal Integrity (3)**

Lecture—3 hours. Prerequisite: course 130B. Design and analysis of interconnects in high-speed circuits and sub-systems; understanding of high-speed signal propagation and signal integrity concepts; electromagnetic modeling tools and experimental techniques. Offered in alternate years. —S.

### **234A. Physics and Technology of Microwave Vacuum Electron Beam Devices I (4)**

Lecture—4 hours. Prerequisite: B.S. degree in physics or electrical engineering or the equivalent background. Physics and technology of electron beam emissions, flow and transport, electron gun design, space charge waves and klystrons. Offered in alternate years. —F.

### **234B. Physics and Technology of Microwave Vacuum Electron Beam Devices II (4)**

Lecture—4 hours. Prerequisite: course 234B. Theory and experimental design of traveling wave tubes, backward wave oscillators, and extended interaction oscillators. Offered in alternate years. —W.

### **234C. Physics and Technology of Microwave Vacuum Electron Beam Devices III (4)**

Lecture—4 hours. Prerequisite: course 234A. Physics and technology of gyrotrons, gyro-amplifiers, free electron lasers, magnetrons, crossfield amplifiers and relativistic devices. Offered in alternate years. —S.

### **235. Photonics (4)**

Lecture—3 hours; project—1 hour. Prerequisite: course 230 (may be taken concurrently). Optical propagation of electromagnetic waves and beams in photonic components and the design of such devices using numerical techniques. Offered in alternate years. —W. (W.)

### **236. Nonlinear Optical Applications (3)**

Lecture—3 hours. Prerequisite: course 130B, course 230 (may be taken concurrently). Nonlinear optical interactions in optical communication, optical information processing and integrated optics. Basic concepts underlying optical nonlinear interactions in materials and guided media. Not open for credit to students who have completed course 233. Offered in alternate years. —F. (F.)

### **237A. Lasers (3)**

Lecture—3 hours. Prerequisite: course 130B or the equivalent and course 235. Theoretical and practical description of lasers. Theory of population inversion, amplification and oscillation using semiclassical oscillator model and rate equations. Description and design of real laser system. (Not open for credit to students who have completed course 226A.) Offered in alternate years. —(F.)

**237B. Laser Physics II (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 237A or Applied Science Engineering 265A. Oscillation threshold. Coupled cavity/atomic rate equations, Linear pulse propagation; dispersion, broadening, compression. Nonlinear pulse propagation. Energy extraction. Optical beams, resonators, eigenmodes, axial/transverse modes. Paraxial ray optics, resonator stability, ABCD matrices. Laser dynamics; transients, spiking, Q-switching, active and passive modelocking. Not open for credit to students who have completed course 226B. Offered in alternate years.—W.

**238. Semiconductor Diode Lasers (3)**

Lecture—3 hours. Prerequisite: course 245A. Understanding of fundamental optical transitions in semiconductor and quantum-confined systems are applied to diode lasers and selected photonic devices. The importance of radiative and non-radiative recombination, simulated emission, excitons in quantum wells, and strained quantum layers are considered. Offered in alternate years.—S.

**239A. Optical Fiber Communications Technologies (4)**

Lecture—4 hours. Prerequisite: course 130B. Physical layer issues for component and system technologies in optical fiber networks. Sources of physical layer impairments and limitations in network scalability. Enabling technologies for wavelength-division-multiplexing and time-division-multiplexing networks. Optical amplifiers and their impact in optical networks (signal-to-noise ratio, gain-equalization, and cascadability).—F. (F.)

**239B. Optical Fiber Communications Systems and Networking (4)**

Lecture—4 hours. Prerequisite: course 239A. Physical layer optical communications systems in network architectures and protocols. Optical systems design and integration using optical component technologies. Comparison of wavelength routed WDM, TDM, and NGI systems and networks. Case studies of next generation technologies. Offered in alternate years.—W. (W.)

**240. Semiconductor Device Physics (3)**

Lecture—3 hours. Prerequisite: course 140B. Physical principles, characteristics and models of fundamental semiconductor device types, including P-N and Schottky diodes, MOSFETs and MESFETs Bipolar Junction Transistors, and light emitters/detectors.—F. (F.)

**241. Introduction to Molecular Electronics (4)**

Lecture/discussion—4 hours. Prerequisite: consent of instructor. Examines molecules for electronic devices and sensors. Course covers: electronic states of molecules, charge transport in nanoscale systems, and fabrication and measurement of molecular-scale devices. Specific Topics: Hartree-Fock and Density Functional Theory, Landauer formalism, coulomb blockade, tunneling and hopping transport. Offered in alternate years.—W. (W.)

**242. Advanced Nanostructured Devices (3)**

Lecture—3 hours. Prerequisite: courses 130A and 140A. Physics of nano-structured materials and device operation. Overview of new devices enabled by nanotechnology; fabrication and characterization methods; applications of nano-structures and devices. Offered in alternate years.—F. (F.)

**244A. Design of Microelectromechanical Systems (MEMS) (3)**

Lecture—3 hours. Prerequisite: course 140A, 140B or consent of instructor. Theory and practice of MEMS design. Micromechanical fundamentals, CAD tools, and case studies. A MEMS design project is required. The designs will be fabricated in a commercial foundry and tested in course 244B. Offered in alternate years.—F. (F.)

**244B. Microsciences (4)**

Lecture/discussion—4 hours. Introduction to the theory of physical and chemical principles at the microscale. Scale effects, surface tension, microfluidic

mechanics, micromechanical properties, intermolecular interactions and micro tribology. (Same course as Biomedical Engineering 218.)—F. (F.)

**245. Micro- and Nano-Technology in Life Sciences (4)**

Lecture/discussion—4 hours. Prerequisite: graduate standing or consent of instructor. Survey of biomedical device design from the engineering and biological perspectives; micro-/nano-fabrication and characterization techniques; surface chemistry and mass transfer; essential biological processes and models; proposal development skills to merge aforementioned themes in a multidisciplinary project. (Same course as Chemical Engineering 245 and Materials Science and Engineering 245.)—S. (S.)

**246. Advanced Projects in IC Fabrication (3)**

Discussion—1 hour; laboratory—6 hours. Prerequisite: course 146B. Individualized projects in the fabrication of analog or digital integrated circuits. Offered in alternate years.—W.

**247. Advanced Semiconductor Devices (4)**

Lecture—3 hours; project. Prerequisite: graduate standing in Engineering. Semiconductor devices, including MOSFETs, heterojunction transistors, light-emitting diodes, lasers, sensors, detectors, power and high-voltage transistors, MEMS resonators, organic semiconductors and photovoltaics. All material is from recent literature, encouraging students to utilize search methods and critically assess the latest research. Offered in alternate years.—F. (F.)

**248. Photovoltaics and Solar Cells (3)**

Lecture—3 hours. Prerequisite: course 140B or equivalent, or consent of instructor. Physics and application of photovoltaics and solar cells, including design, fabrication technology, and grid incorporation. Mono and microcrystalline silicon devices; thin-film technologies, heterojunction and organic-semiconductor technologies. Collectors, electrical inverters and infrastructure issues. Challenges and concerns. (Same course as Engineering-Material Science 246.) Offered in alternate years.—W.

**249. Nanofabrication (3)**

Lecture—3 hours. Prerequisite: graduate standing in Engineering. Theory and practices of nanofabrication used for producing ICs, electronic devices, optoelectronics, sensors, and microstructures. Major topics include electron-, photon-, and ion-beams and their interactions with solids, chemical vapor depositions, plasma processing and micromachining. Offered in alternate years.—S.

**250. Linear Systems and Signals (4)**

Lecture—4 hours. Prerequisite: course 150A. Mathematical description of systems. Selected topics in linear algebra. Solution of the state equations and an analysis of stability, controllability, observability, realizations, state feedback and state estimation. Discrete-time signals and systems, and the Z-transform.—F. (F.)

**251. Nonlinear Systems (3)**

Lecture—3 hours. Prerequisite: course 250. Nonlinear differential equations, second-order systems, approximation methods, lyapunov stability, absolute stability, Popov criterion, circle criterion, feedback linearization techniques. Offered in alternate years.—S. (S.)

**252. Multivariable Control System Design (3)**

Lecture—3 hours. Prerequisite: course 250. Modern control system design, theory, and techniques. Topics will include single-loop feedback design; stability, performance and robustness of multivariable control systems; LQG design; H-infinity design; frequency response methods; and optimization-based design. Offered in alternate years.—W. (W.)

**254. Optimization (3)**

Lecture—3 hours. Prerequisite: Mathematics 22A, knowledge of FORTRAN or C. Modeling optimization problems in engineering design and other applications; optimality conditions; unconstrained optimization (gradient, Newton, conjugate gradient and quasi-Newton methods); duality and Lagrangian

relaxation constrained optimization. (Primal method and an introduction to penalty and augmented Lagrangian methods.) Offered in alternate years.—W.

**255. Robotic Systems (3)**

Lecture—3 hours. Introduction to robotic systems. Mechanical manipulators, kinematics, manipulator positioning and path planning. Dynamics of manipulators. Robot motion programming and control algorithm design. Offered in alternate years.—W. (W.)

**256. Stochastic Optimization in Dynamic Systems (4)**

Lecture—4 hours. Prerequisite: course 260 or the equivalent. Markov Decision Processes (MDP), dynamic programming, multiarmed bandit, Partially observable MDP, optimal stopping, stochastic scheduling, sequential detection and quickest change detection, competitive MDP and game theory, applications in dynamic systems such as queueing networks, communication systems, and multi-agent systems. Offered in alternate years.—S. (S.)

**260. Random Signals and Noise (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 120, course 150A; course 250 recommended. Random processes as probabilistic models for signals and noise. Review of probability, random variables, and expectation. Study of correlation function and spectral density, ergodicity and duality between time averages and expected values, filters and dynamical systems. Applications.—F. (F.)

**261. Signal Processing for Communications (4)**

Lecture—4 hours. Prerequisite: course 165, 260 or consent of instructor. Signal processing in wireless and wireline communication systems. Characterization and distortion of wireless and wireline channels. Channel equalization and maximum likelihood sequence estimation. Channel precoding and pre-equalization. OFDM and transmit diversity. Array processing. Offered in alternate years.—S. (S.)

**262. Multi-Access Communications Theory (4)**

Lecture—3 hours; project. Prerequisite: Statistics 120 or equivalent; course 173A or Engineering Computer Science 152A. Maximum stable throughput of Poisson collision channels. Classic collision resolution algorithms. Carrier sensing multiple access and its performance analysis. System stability analysis. Joint design of the physical/medium access control layers. Capacity region of multi-access channels. Multi-access with correlated sources. Offered in alternate years.—S. (S.)

**263. Optimal and Adaptive Filtering (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 260. Geometric formulation of least-squares estimation problems. Theory and applications of optimum Wiener and Kalman filtering. MAP and maximum likelihood estimation of hidden Markov models, Viterbi algorithm. Adaptive filtering algorithms, properties and applications. Offered in alternate years.—S. (S.)

**264. Estimation and Detection of Signals in Noise (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 260. Introduction to parameter estimation and detections of signals in noise. Bayes and Neyman-Pearson likelihood-ratio tests for signal detection. Maximum-likelihood parameter estimation. Detection of known and Gaussian signals in white or colored noise. Applications to communications, radar, signal processing.—W. (W.)

**265. Principles of Digital Communications (4)**

Lecture—4 hours. Prerequisite: courses 165 and 260, or consent of instructor. Introduction to digital communications. Coding for analog sources. Characterization of signals and systems. Modulation and demodulation for the additive Gaussian channel. Digital signaling over bandwidth-constrained linear filter channels and over fading multipath channels. Spread spectrum signals.—W. (W.)

**266. Information Theory and Coding (3)**

Lecture—3 hours. Prerequisite: Statistics 120. Information theory and coding. Measure of information. Redundancy reduction; encoding of an information source. Capacity of a communication channel, error-free communications. Offered in alternate years.—S.

**267. Mobile Communications (4)**

Lecture/laboratory—3 hours. Prerequisite: courses 260 and 265 (can be taken concurrently). Time-varying multi-path fading channel models and receiver performance in fading channels; multiple access techniques and multiple access receivers design and performance; optimum design and the capacity of wireless channels. Offered in alternate years.—W.

**269A. Error Correcting Codes I (3)**

Lecture—3 hours. Prerequisite: Mathematics 22A and course 160. Introduction to the theory and practice of block codes, linear block codes, cyclic codes, decoding algorithms, coding techniques.—F. (F.)

**269B. Error Correcting Codes II (3)**

Lecture—3 hours. Prerequisite: course 165 and 269A. Introduction to convolutional codes, turbo codes, trellis and block coded modulation codes, soft-decision decoding algorithms, the Viterbi algorithm, reliability-based decoding, trellis-based decoding, multistage decoding. Offered in alternate years.—S. (S.)

**270. Computer Architecture (3)**

Lecture—3 hours. Prerequisite: course 170 or Computer Science Engineering 154B. Introduction to modern techniques for high-performance single and multiple processor systems. Topics include advanced pipeline design, advanced memory hierarchy design, optimizing pipeline and memory use, and memory sharing among multiprocessors. Case studies of recent single and multiple processor systems.—F. (F.)

**272. High-Performance Computer Architecture (4)**

Lecture—4 hours. Prerequisite: course 270 or Computer Science Engineering 201A. Designing and analysis of high performance computer architecture with emphasis on vector processing, on-chip interconnect networks, chip-level multiprocessors, memory and storage subsystem design and impact of technological advances on computer architecture. Offered in alternate years.—S. (S.)

**273. Networking Architecture and Resource Management (4)**

Lecture—3 hours; project. Prerequisite: course 173A or Computer Science and Engineering 152A. Pass One and Pass Two open to Graduate Students in Computer Science and Electrical and Computer Engineering only. Concepts and design principles of computer networks. Network architectures, protocol mechanisms and implementation principles (transport/network/data-link layers), network algorithms, router mechanisms, design requirements of applications, network simulation, modeling and performance analysis. (Same course as Computer Science Engineering 258.)—W. (W.) Chuah, Mohapatra

**274. Internet Measurements, Modeling and Analysis (4)**

Lecture—3 hours; project. Prerequisite: Computer Science Engineering 252 or course 273. Advanced topics in the theoretical foundations of network measurements, modeling, and statistical inferencing. Applications to Internet engineering, routing optimization, load balancing, traffic engineering, fault tolerance, anomaly detection, and network security. Individual project requirement. Offered in alternate years.—S. (S.)

**276. Fault-Tolerant Computer Systems: Design and Analysis (3)**

Lecture—3 hours. Prerequisite: courses 170, 180A. Introduces fault-tolerant digital system theory and practice. Covers recent and classic fault-tolerant techniques based on hardware redundancy, time redundancy, information redundancy, and software

redundancy. Examines hardware and software reliability analysis, and example fault-tolerant designs. Not open for credit to students who have completed course 276A. Offered in alternate years.—W.

**277. Graphics Architecture (3)**

Lecture—3 hours. Prerequisite: Computer Science Engineering 154B or course 170, Computer Science Engineering 175. Design and analysis of the architecture of computer graphics systems. Topics include the graphics pipeline with a concentration on hardware techniques and algorithms, exploiting parallelism in graphics, and case studies of noteworthy and modern graphics architectures. Offered in alternate years.—W. (W.)

**278. Computer Arithmetic for Digital Implementation (3)**

Lecture—3 hours. Prerequisite: courses 170, 180A. The design and implementation of computer arithmetic logic units are studied with particular emphasis on high-speed performance requirements. Addition [subtraction], multiplication and division operations are covered, and fixed and floating-point representations are examined. Offered in alternate years.—S.

**281. VLSI Digital Signal Processing (4)**

Lecture—3 hours; project. Prerequisite: courses 150B, 170, 180B or consent of instructor. Digital signal processors, building blocks, and algorithms. Design and implementation of processor algorithms, architectures, control, functional units, and circuit topologies for increased performance and reduced circuit size and power dissipation. Offered in alternate years.—W. (W.)

**282. Hardware Software Codesign (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: course 170, 180B. Specification and design of embedded systems; modeling and performance estimation; hardware/software partitioning; co-simulation; design re-use; platform-based design; reconfigurable computing.—S. (S.)

**283. Advanced Design Verification of Digital Systems (4)**

Lecture—3 hours; project. Prerequisite: courses 170 and 180A. Design verification techniques for digital systems; simulation-based design verification techniques; formal verification techniques, including equivalence checking, model checking, and theorem proving; timing analysis and verification; application of design certification techniques to microprocessors. Offered in alternate years.—W. (W.)

**284. Design and Optimization of Embedded Computing Systems (4)**

Lecture—4 hours. Prerequisite: courses 170 and 180B, or consent of instructor. Computer Science Engineering 122A recommended. Introduction to design and optimization of digital computing systems for embedded applications. Topics include combinatorial optimization techniques, performance and energy optimization in embedded systems, compilation and architecture-specific mapping, programmable and reconfigurable platforms; design automation and algorithmic improvements to design process. Offered in alternate years.—W. (W.)

**286. Introduction to Digital System Testing (3)**

Lecture—3 hours. Prerequisite: course 180A; Statistics 120 or 131A. A review of several current techniques used to diagnose faults in both combinational and sequential circuits. Topics include path sensitization procedures, Boolean difference, D-algorithm random test generation, TC testing and an analysis of the effects of intermittent faults. Not open for credit to students who have completed course 276A. Offered in alternate years.—W.

**289A. Special Topics in Electrical and Computer Engineering; Computer Science (1-5)**

Lecture/laboratory—1-5 units. Prerequisite: consent of instructor. Special topic in Computer Science. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289B. Special Topics in Electrical and Computer Engineering; Programming Systems (1-5)**

Lecture/laboratory—1-5 units. Prerequisite: consent of instructor. Special topic in Programming Systems. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289C. Special Topics in Electrical and Computer Engineering; Digital Systems (1-5)**

Lecture/laboratory—1-5 units. Prerequisite: consent of instructor. Special topic in Digital Systems. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289D. Special Topics in Electrical and Computer Engineering; Digital Systems (1-5)**

Lecture/laboratory—1-5 units. Prerequisite: consent of instructor. Special topic in Digital Systems. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289E. Special Topics in Electrical and Computer Engineering; Signal Transmission (1-5)**

Lecture/laboratory—1-5 units. Prerequisite: consent of instructor. Special topic in Signal Transmission. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289F. Special Topics in Electrical and Computer Engineering; Digital Communication (1-5)**

Lecture/laboratory—1-5 units. Prerequisite: consent of instructor. Special topic in Digital Communication. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289G. Special Topics in Electrical and Computer Engineering; Control Systems (1-5)**

Lecture/laboratory—1-5 units. Prerequisite: consent of instructor. Special topic in Control Systems. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289H. Special Topics in Electrical and Computer Engineering; Robotics (1-5)**

Lecture/laboratory—1-5 units. Prerequisite: consent of instructor. Special topic in Robotics. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289I. Special Topics in Electrical and Computer Engineering; Signal Processing (1-5)**

Lecture/laboratory—1-5 units. Prerequisite: consent of instructor. Special topic in Signal Processing. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289J. Special Topics in Electrical and Computer Engineering; Image Processing (1-5)**

Lecture/laboratory—1-5 units. Prerequisite: consent of instructor. Special topic in Image Processing. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289K. Special Topics in Electrical and Computer Engineering; High Frequency Phenomena and Devices (1-5)**

Lecture/laboratory—1-5 units. Prerequisite: consent of instructor. Special topic in High Frequency Phenomena and Devices. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289L. Special Topics in Electrical and Computer Engineering; Solid-State Devices and Physical Electronics (1-5)**

Lecture/laboratory—1-5 units. Prerequisite: consent of instructor. Special topic in Solid-State Devices and Physical Electronics. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289M. Special Topics in Electrical and Computer Engineering; Systems Theory (1-5)**

Lecture/laboratory—1.5 units. Prerequisite: consent of instructor. Special topic in Systems Theory. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289N. Special Topics in Electrical and Computer Engineering; Active and Passive Circuits (1-5)**

Lecture/laboratory—1.5 units. Prerequisite: consent of instructor. Special topic in Active and Passive Circuits. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289O. Special Topics in Electrical and Computer Engineering; Integrated Circuits (1-5)**

Lecture/laboratory—1.5 units. Prerequisite: consent of instructor. Special topic in Integrated Circuits. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289P. Special Topics in Electrical and Computer Engineering; Computer Software (1-5)**

Lecture/laboratory—1.5 units. Prerequisite: consent of instructor. Special topic in Computer Software. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289Q. Special Topics in Electrical and Computer Engineering; Computer Engineering (1-5)**

Lecture/laboratory—1.5 units. Prerequisite: consent of instructor. Special topic in Computer Engineering. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289R. Special Topics in Electrical and Computer Engineering; Microprocessing (1-5)**

Lecture/laboratory—1.5 units. Prerequisite: consent of instructor. Special topic in Microprocessing. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289S. Special Topics in Electrical and Computer Engineering; Electronics (1-5)**

Lecture/laboratory—1.5 units. Prerequisite: consent of instructor. Special topic in Electronics. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289T. Special Topics in Electrical and Computer Engineering; Electromagnetics (1-5)**

Lecture/laboratory—1.5 units. Prerequisite: consent of instructor. Special topic in Electromagnetics. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289U. Special Topics in Electrical and Computer Engineering; Optoelectronics (1-5)**

Lecture/laboratory—1.5 units. Prerequisite: consent of instructor. Special topic in Optoelectronics. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**289V. Special Topics in Electrical and Computer Engineering; Computer Networks (1-5)**

Lecture/laboratory—1.5 units. Prerequisite: consent of instructor. Special topic in Computer Networks. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

**290. Seminar in Electrical and Computer Engineering (1)**

Seminar—1 hour. Discussion and presentation of current research and development in Electrical and Computer Engineering. May be repeated for credit. (S/U grading only.)—F, W. (F, W.)

**290C. Graduate Research Group Conference in Electrical and Computer Engineering (1)**

Discussion—1 hour. Prerequisite: consent of instructor. Research problems, progress, and techniques in electrical and computer engineering. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**291. Solid-State Circuit Research Laboratory Seminar (1)**

Seminar—1 hour. Prerequisite: graduate standing. Lectures on solid-state circuit and system design by various visiting experts in the field. May be repeated for credit. (S/U grading only.)—S. (S.)

**292. Seminar in Solid-State Technology (1)**

Seminar—1 hour. Prerequisite: graduate standing. Lectures on solid-state technology by various visiting experts in the field. May be repeated for credit. (S/U grading only.)—S. (S.)

**293. Computer Engineering Research Seminar (1)**

Seminar—1 hour. Prerequisite: graduate standing or consent of instructor. Lectures, tutorials, and seminars on topics in computer engineering. May be repeated for credit up to four times. (S/U grading only.)—F, S. (F, S.)

**294. Communications, Signal and Image Processing Seminar (1)**

Seminar—1 hour. Prerequisite: graduate standing. Communications, signal and image processing, video engineering and computer vision. May be repeated for credit. (S/U grading only.)—F, W, S.

**295. Systems, Control and Robotics Seminar (1)**

Seminar—1 hour. Prerequisite: graduate standing. Seminars on current research in systems and control by faculty and visiting experts. Technical presentations and lectures on current topics in robotics research and robotics technology. May be repeated for credit. (S/U grading only.)—W. (W.)

**296. Photonics Research Seminar (1)**

Seminar—1 hour. Prerequisite: graduate standing. Lectures on photonics and related areas by faculty and visiting experts. May be repeated for credit. (S/U grading only.)—F, S. (F, S.)

**298. Group Study (1-5)**

Prerequisite: consent of instructor. (S/U grading only.)

**299. Research (1-12)**  
(S/U grading only.)

**Professional**

**390. The Teaching of Electrical Engineering (1)**

Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in Electrical Engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (S/U grading only.)—F. (F.)

**396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**Engineering: Materials Science and Engineering**

# Engineering: Materials Science and Engineering

(College of Engineering)

Subhash Risbud, Ph.D., Chairperson of the Department 530-752-6496; Fax 530-752-1031

**Department Office.** 3001 Ghausi Hall  
530-752-0400; Fax 530-752-1031;  
<http://chms.engineering.ucdavis.edu>

## Faculty

Klaus van Benthem, Ph.D., Associate Professor  
Ricardo Castro, Ph.D., Associate Professor  
Susan Gentry, Ph.D., Lecturer  
Jeffery C. Gibeling, Ph.D., Professor  
Sangtae Kim, Ph.D., Professor  
Denise Krol, Ph.D., Professor  
Subhash Mahajan, Ph.D., Distinguished Professor  
Alexandra Navrotsky, Ph.D., Distinguished Professor and Endowed Chair (Chemical Engineering; Chemistry; Land, Air and Water Resources; Materials Science and Engineering)

Atul Parikh, Ph.D., Professor (Biomedical Engineering; Materials Science and Engineering)  
Subhash H. Risbud, Ph.D., Distinguished Professor and Endowed Chair Distinguished Teaching Award-Graduate/Professional

Sabyasachi Sen, Ph.D., Professor  
Yayoi Takamura, Ph.D., Associate Professor

## Emeriti Faculty

Joanna R. Groza, Ph.D., Professor Emeritus  
David G. Howitt, Ph.D., Professor Emeritus  
Amiya K. Mukherjee, Ph.D., Professor Emeritus Academic Senate Distinguished Teaching Award, UC Davis Prize for Teaching and Scholarly Achievement, Distinguished Graduate Mentoring Award

Zuhair A. Munir, Ph.D., Professor Emeritus  
James F. Shackelford, Ph.D., Professor Academic Senate Distinguished Teaching Award

The Department of Materials Science and Engineering offers one undergraduate program: Materials Science and Engineering.

**Mission Statement.** The mission of the Department of Materials Science and Engineering is to promote excellence in innovative cross-disciplinary materials education and research within an inclusive culture of students, staff, and faculty committed to creating a climate that respects and embraces racial, gender, and ethnic diversity at every level.

**Honors Program.** An Honors Program is available to qualified students in Materials Science and Engineering. It is a four-year program designed to challenge the most talented students in the major. Students invited to participate will take a one-unit honors seminar in their freshman year and will enroll in various one-unit honors courses. In the upper division, students will complete either an honors thesis or a project that might involve local industry. Students must maintain a grade point average of 3.500 to continue in the program. Successful completion of the Honors Program will be acknowledged on the student's transcript.

## Materials Science and Engineering Undergraduate Program

The Materials Science and Engineering program is accredited by the Engineering Accreditation Commission of ABET; see <http://www.abet.org>.

Materials science and engineering is directed toward an understanding of the structure, properties, and processing of materials. Society demands new and improved materials with capabilities far superior to common metals, polymers, and ceramics. New materials are needed for high-speed transportation systems, surgical and dental implants, new generations of power plants, renewable energy sources, and solid-state electronic and photonic devices in

computer and communication technology. Both the development of new materials and the understanding of present-day materials demand a thorough knowledge of basic engineering and scientific principles, including crystal structure, elastic and plastic behavior, thermodynamics, phase equilibria and reaction rates, and structural and physical and chemical behavior of engineering materials.

Materials engineers study phenomena found in many different engineering operations, from fracture behavior in automobiles to fatigue behavior in aircraft frames, from corrosion behavior in petro-chemical refineries to radiation-induced damage in nuclear power plants, and from the fabrication of steel to the design of semiconductors. Materials engineers are also increasingly involved in developing the new materials needed to attain higher efficiencies in existing and proposed energy conversion schemes and will play a central role in the development of new technologies based on composites and high-temperature superconductivity.

The undergraduate materials science and engineering program provides the background for activities in research, processing, and the design of materials. The curriculum is based on a common core of courses basic to engineering; courses taken during your first two years provide a strong foundation in fundamental engineering concepts.

A minor in Materials Science is also available. Please see the description, below.

**Objectives.** We educate students in the fundamentals of materials science and engineering, balanced with the application of these principles to practical problems; educate students as independent, critical thinkers who can also function effectively in a team; educate students with a sense of community, ethical responsibility, and professionalism; educate students for careers in industry, government, and academia; teach students the necessity for continuing education and self-learning; and foster proficiency in written and oral communications.

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

Exclusive of General Education units, the minimum number of units required for the Materials Science and Engineering major is 156.

#### Lower Division Required Courses

Mathematics 21A-21B-21C-21D .....	16
Mathematics 22A-22B .....	6
Physics 9A-9B-9C-9D .....	19
Chemistry 2A, 2B, 2C or Chemistry 2AH, 2BH, 2CH .....	15
Engineering 17, 45 or 45Y .....	8
Materials Science and Engineering 2.....	2
Chemical Engineering and Materials Science 6 .....	4
English 3 or University Writing Program 1 or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5 (grade of C- or better required) .....	4
Communication 1 or 3 .....	4

#### Upper Division Required Courses

Engineering 190 .....	3
Materials Science and Engineering 160, 162, 162L, 164, 172, 172L, 174, 174L, 180, 181, 188A, 188B.....	42
Select one course from Engineering 180, Mathematics 135A, Statistics 120, 131A, Civil and Environmental Engineering 114, Chemical Engineering 140, Mechanical Engineering 115, or Physics 104A.....	4
Select one course from Chemistry 110A, 124A, 128A, or Physics 108 and 108L, 110A, 122A, 151, 160 .....	3
A minimum of 14 units from one of the following focus areas:	

- Biomedical Engineering: Biology 2A,
- Biomedical Engineering 20, 106\*, 109

Biological Systems Engineering: Biology 2A, Engineering 100, Biological Systems Engineering 75, 165	
Chemical Engineering: Chemical Engineering 51, 140, 141, 142	
Civil Engineering: Engineering 35, 104, Civil Engineering 130, 132	
Electrical Engineering: Engineering 100, Electrical Engineering 140A, 140B, 146A	
Mechanical Engineering: Engineering 35, 102, 103, 104 .....	14
Select one course from Chemical Engineering 158A, Materials Science Engineering 170, Engineering 106, 160, 188, or Civil Engineering 123, 125, 143 .....	3-4
Depending on area of focus, 6-9 units of upper division electives .....	6-9
Students may receive up to a maximum of 4 units of credit for engineering 199 courses, when these courses are approved by the departmental undergraduate studies committee. To receive credit, students must submit a summary of their research to the committee. A letter of support from the faculty mentor is also required to verify that you have conducted substantial research activity. *Students would need to take Neurobiology, Physiology, and Behavior 101 as an elective to enroll in Biomedical Engineering 106	
Upper Division Composition Requirement .....	0 or 4
One course from the following (grade of C- or better is required): University Writing Program 102E, 102F, 104A, 104E, 104T or passing the Upper Division Composition Exam.	

#### Materials Science Minor

There is a constant need for professionals with more knowledge and experience in understanding the behavior of materials from which products such as electronics, sensors, biological implants, transportation vehicles, medical devices and infrastructure are made. The goal of this minor is to prepare students for careers that require training in materials science, including the fundamentals of thermodynamics and kinetics and their effects on phase composition and structure, as well as the complex relationships between composition, structure, processing and behavior/performance. Topics covered include material thermodynamics and kinetics, materials structural analysis, and structure-property relationships for electronic, optical, magnetic and mechanical behavior. The minor is expected to accommodate persons of diverse backgrounds, such as those majoring in engineering, physical sciences, biological sciences, and mathematics.

All courses must be taken for a letter grade. A grade of C- or better is required for all courses used to satisfy minor requirements, with an overall GPA in minor requirement courses of 2.000 or better.

#### Minor Requirements

Materials Science.....	UNITS
Materials Science and Engineering 160, 162, 164.....	12

Choose one of the following: Materials

Science 172 or 174.....

Choose an additional four units from the

following, if not used above, Materials

Science 147, 162L, 172, 172L, 174, 174L,

180, 181 or 182.....

**Minor Adviser.** S. Gentry (Department of Materials Science and Engineering)

#### Graduate Programs in the Department of Materials Science and Engineering

The Department of Materials Science and Engineering is home to a top-20 ranked graduate programs in Materials Science & Engineering. We offer a unique interdisciplinary environment for graduate

studies, with renowned faculty and state-of-the-art research facilities.

#### The Graduate Program in Materials Science and Engineering

M.Eng., M.S., and Ph.D.

Ph.D. designated emphases are available as specializations in biotechnology, biophysics, and nuclear science.

<http://chms.engineering.ucdavis.edu>

530-752-7952

The Materials Science and Engineering Graduate Program provides students with a strong background in advanced materials synthesis, processing, and characterization, both from an experimental and theoretical standpoint.

Doctoral students are typically offered competitive 4-year financial offers of fellowships and research/teaching assistantships which include tuition, fees, and a stipend.

Financial offers are subject to satisfactory progress towards completion of degree requirements.

Research areas include biomaterials, catalysts, ceramics, electronic and electrochemical properties and devices, glasses, green engineering and design, interfaces, magnetic materials and devices, materials microstructure and/or processing, mathematical modeling, mechanical properties and synthesis, metals, microscopy, molecular modeling, nanomaterials, optical properties and devices, polymers, renewable energy, sintering, structural materials, thermochemistry, and thin films.

#### Research Facilities and Partnerships:

- Interdisciplinary Center for Electron Microscopy
- Center for Northern California Nanotechnology
- Center for Nanomaterials in the Environment, Agriculture and Technology

Complete Information is available on our website.

#### Courses in Engineering: Materials Science and Engineering (EMS)

For courses in Chemical and Materials Science Engineering (ECM) and Chemical Engineering (ECH), see [Engineering: Chemical Engineering](#), on page 276.

#### Lower Division

##### 2. Materials Marvels (2)

Lecture/discussion—2 hours. Restricted to lower division students only. Role of materials in technological societies and their impact on our way of living.

Exploration of how materials are extracted from the earth, processed, and shaped into products, including discussion of disposal and re-use of materials.

GE credit: SciEng | SE.—F, (F.)

##### 6H. Honors Materials Science Computer Applications (1)

Discussion—1 hour. Prerequisite: enrollment in the Materials Science and Engineering Honors Program; concurrent enrollment in Engineering 6 required.

Restricted to students in the Materials Science and Engineering Honors Program. Examination of materials science computer applications through additional readings, discussions, collaborative work, or special activities which may include projects or computer simulations. Offered irregularly.—W. (W.)

##### 9H. Honors Solid-State Materials Science (1)

Discussion—1 hour. Prerequisite: enrollment in the Materials Science and Engineering Honors Program; concurrent enrollment in Physics 9D required.

Restricted to students in the Materials Science and Engineering Honors program. Examination of solid-state materials science and modern physics topics through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Offered irregularly.—S. (S.)

**Upper Division****147. Principles of Polymer Materials Science (3)**

Lecture—3 hours. Prerequisite: Chemistry 2A-2B; Chemistry 8A-8B or Engineering 45; introductory physics. Basic principles of polymer science presented including polymer structure and synthesis; polymerization mechanisms, polymer classes, properties, and reactions; polymer morphology, rheology, and characterization; polymer processing. (Same course as Fiber and Polymer Science 100.) GE credit: SciEng | QL, SE, SL, VL, WE.—S. (S.) Pan

**160. Thermodynamics of Materials Processes and Phase Stability (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: C- or better in each of the following: Engineering 45, Physics 9B, Mathematics 22B; Chemistry 2C (recommended). Review of thermodynamic principles of interest to materials scientists and engineers. Application of thermodynamics to material processing, phase stability, corrosion. GE credit: SciEng | QL, SE, SL, VL, WE.—F. (F.)

**162. Structure and Characterization of Engineering Materials (4)**

Lecture—4 hours. Prerequisite: C- or better in each of the following: Engineering 45, Mathematics 22, Physics 9B. Description of the structure of engineering materials on the atomic scale by exploring the fundamentals of crystallography. The importance of this structure to materials' properties. Description of experimental determination using x-ray diffraction techniques. GE credit: SciEng | QL, SE, —W. (W.)

**162L. Structure and Characterization of Materials Laboratory (2)**

Laboratory—3 hours; discussion—1 hour. Prerequisite: course 162 (concurrent enrollment recommended). Experimental investigations of structure of solid materials are combined with techniques for characterization of materials. Laboratory exercises emphasize methods used to study structure of solids at the atomic and microstructural levels. Methods focus on optical, x-ray and electron techniques. Only 2 units of credit allowed to students who have completed course 134L. Not open for credit to students who have completed course 132L. GE credit: SciEng, Wrt | QL, SE, SL, VL, WE.—W. (W.)

**164. Rate Processes in Materials Science (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: C- or better in Engineering 45, and course 160. Basic kinetic laws and the principles governing phase transformations. Applications in diffusion, oxidation, nucleation, growth and spinodal transformations. GE credit: SciEng | QL, SE, SL, VL, WE.—W. (W.)

**170. Sustainable Energy Technologies: Batteries, Fuel Cells, and Photovoltaic Cells (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 45. Open to students in Engineering or related fields. Basic principles of future energy devices such as lithium batteries, fuel cells, and photovoltaic cells. Examines the current status of these energy technologies and analyze challenges that still must be overcome. Offered irregularly. GE credit: SciEng | SE.—Su. (Su.)

**172. Electronic, Optical and Magnetic Properties of Materials (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 110A or Physics 9D; Engineering 6 or Chemical and Materials Science 6 or equivalent (recommended). Electronic, optical, and magnetic properties of materials as related to structure and processing of solid state materials. Physical principles for understanding the properties of metals, semiconductors, ceramics, and amorphous solids and the applications of these materials in engineering. GE credit: SciEng | QL, SE, SL, VL, WE.—F. (F.)

**172L. Electronic, Optical and Magnetic Properties Laboratory (2)**

Laboratory—3 hours; lecture/laboratory—1 hour. Prerequisite: course 172 (concurrent enrollment recommended). Experimental investigation of electronic, optical and magnetic properties of

engineering materials, emphasizing the fundamental relationship between microstructure and properties as well as the influence of rate processes on the evolution of the microstructure and properties. GE credit: SciEng, Wrt | QL, SE, SL, VL, WE.—F. (F.)

**174. Mechanical Behavior of Materials (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: C- or better in Engineering 45; course 162 (recommended). Microscopic and macroscopic aspects of the mechanical behavior of engineering materials, with emphasis on recent development in materials characterization by nondestructive testing. Fundamental aspects of plasticity in engineering materials, strengthening mechanisms and mechanical failure modes of materials systems. GE credit: SciEng, Wrt | QL, SE, SL, VL, WE.—S. (S.)

**174L. Mechanical Behavior Laboratory (2)**

Laboratory—3 hours; lecture/laboratory—1 hour. Prerequisite: course 174 (concurrent enrollment recommended). Experimental investigation of mechanical behavior of engineering materials. Laboratory exercises emphasize the fundamental relationship between microstructure and mechanical properties, and the evolution of the microstructure as a consequence of rate process. Not open for credit to students who have completed course 138L. GE credit: SciEng, Wrt | QL, SE, SL, VL, WE.—S. (S.)

**180. Materials in Engineering Design (4)**

Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: C- or better in Engineering 45. Restricted to students with upper division standing. Quantitative treatment of materials selection for engineering applications. Discussion of design and material selection strategy; process and process selection strategy; process economics; life-cycle thinking and eco-design. Use of materials selection software. GE credit: SciEng, Wrt | OL, SE, SL, VL, WE.—S. (S.)

**181. Materials Processing (4)**

Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: C- or better in Engineering 45; and Engineering 105 or Chemical Engineering 152B or Electrical & Computer Engineering 140A or course 164. Principles of phase equilibria, thermodynamics and reaction kinetics applied to materials processing. Effects of processing variables on the structure-property relationship. Fundamentals of the manufacturing processes for electronic, optical, functional and structural materials. GE credit: SciEng, Wrt | OL, SE, VL, WE.—W. (W.)

**182. Failure Analysis (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: C- or better in Engineering 45; course 174 (recommended). Analysis of the way materials fail. Effects of temperature, mechanical deformation and corrosion on the properties of materials. Forensics and methodologies for investigating failures of materials including optical microscopy, x-ray analysis and scanning electron microscopy. Investigation of practical problems. GE credit: SciEng, Wrt | QL, SE, VL, WE.

**188A. Materials Design Project (4)**

Laboratory—4 hours; discussion—1 hour. Prerequisite: courses 160, 162, 164, 172, and 174. Major materials design experience involving analysis of real materials synthesis/processing/fabrication and technological applications including critical assessments of economic, manufacturing, and ethical constraints. Various principles of materials science are integrated into a culminating team design project. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | OL, SE, SL, VL, WE.—W. (W.)

**188AH. Honors Materials Design (1)**

Discussion—1 hour. Prerequisite: enrollment in the Materials Science and Engineering Honors Program. Examination of special topics covered in the materials design course through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Open only to students in the Materials Science and Engineering Honors program. Offered irregularly.—W. (W.)

**188B. Materials Design Project (4)**

Laboratory—4 hours; discussion—1 hour. Prerequisite: course 188A. Major materials design experience involving analysis of real materials synthesis/processing/fabrication and technological applications including critical assessments of economic, manufacturing, and ethical constraints. Various principles of materials science are integrated into a culminating team design project. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | OL, SE, SL, VL, WE.—S. (S.)

**188BH. Honors Materials Design (1)**

Discussion—1 hour. Prerequisite: enrollment in the Materials Science and Engineering Honors Program. Examination of special topics covered in the materials design course through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Open only to students in the Materials Science and Engineering Honors Program. Offered irregularly.—S. (S.)

**190C. Research Group Conferences (1)**

Discussion—1 hour. Prerequisite: consent of instructor; upper division standing. Individual and/or group conference on problems, progress and techniques in materials research. May be repeated for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

**198. Directed Group Study (1-5)**

Lecture—1-5 hours. Prerequisite: consent of instructor. Group study of selected topics. (P/NP grading only.) Offered irregularly.—F, W, S. (F, W, S.)

**199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. Special study for advanced undergraduates. (P/NP grading only.)—F, W, S. (F, W, S.)

**Graduate****230. Fundamentals of Electron Microscopy (3)**

Lecture—2 hours; lecture/discussion—1 hour. Prerequisite: course 162. Principles and techniques of scanning and transmission of electron microscopy used in the study of materials will be described. Emphasis upon practical applications.—W. (W.)

**230L. Laboratory for Electron Microscopy (2)**

Laboratory—6 hours. Prerequisite: course 230 concurrently. Practical application of techniques of electron scanning and transmission microscopy including x-ray microanalysis. Offered irregularly.—W. (W.)

**232. Advanced Topics in Transmission Electron Microscopy (3)**

Lecture—1 hour; discussion—2 hours. Prerequisite: course 230. Advanced course in the techniques of electron microscopy including analytical techniques, probe diffraction methods, and high resolution imaging. Offered irregularly.—W. (W.)

**232L. Laboratory for Advanced Transmission Electron Microscopy (2)**

Discussion—1 hour; laboratory—3 hours. Prerequisite: course 230L. Laboratory in advanced transmission electron microscopy techniques relevant to specific graduate research projects in materials science. Offered irregularly.—W. (W.)

**241. Principles and Applications of Dislocation Mechanics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in Engineering; consent of instructor. Concepts in dislocation theory are applied to explain plasticity of crystalline solids. Glide and climb of dislocations, strain hardening, recrystallization, theories of creep processes and interaction of dislocation with solute atoms, precipitates and impurity clouds are discussed. Offered irregularly.—W. (W.)

**243. Kinetics of Phase Transformation in Engineering Materials (3)**

Lecture—3 hours. Prerequisite: graduate standing in Engineering and consent of instructor; course 160 recommended. Theory of alloying, kinetics of phase

changes, homogenous and heterogeneous transformation, transformation by shear, order-disorder reactions. Offered irregularly.—S. (S.)

#### **244. Interaction of Materials and their Environment (3)**

Lecture—3 hours. Prerequisite: Engineering 45 and 105A, or consent of instructor. Thermodynamic and kinetic foundations of the corrosion and oxidation processes. Practical aspects of corrosion control and prevention. Stress-corrosion and gas-embrittlement phenomena. Special topics in corrosion; microbiological and atmospheric corrosion. Offered irregularly.—F. (F.)

#### **245. Micro- and Nano-Technology in Life Sciences (4)**

Lecture/discussion—4 hours. Prerequisite: graduate standing or consent of instructor. Survey of biomedical device design from the engineering and biological perspectives; micro-/nano-fabrication and characterization techniques; surface chemistry and mass transfer; essential biological processes and models; proposal development skills to merge aforementioned themes in a multidisciplinary project. (Same course as Electrical and Computer Engineering 245 and Chemical Engineering 245.)—S. (S.) Seker

#### **246. Photovoltaics and Solar Cells (3)**

Lecture—3 hours. Prerequisite: Electrical & Computer Engineering 140B or equivalent, or permission of instructor. Physics and application of photovoltaics and solar cells, including design, fabrication technology, and grid incorporation. Mono and microcrystalline silicon devices; thin-film technologies, heterojunction and organic-semiconductor technologies. Collectors, electrical inverters and infrastructure issues. Challenges and concerns. (Same course as Electrical & Computer Engineering 248.) Offered irregularly.—W. (W.)

#### **248. Fracture of Engineering Materials (3)**

Lecture—3 hours. Prerequisite: course 174. Description of the failure of materials by crack propagation. Topics include the stress fields about elastic cracks, the Griffith-Irwin analysis, descriptions of plastic zones, fracture toughness testing, microstructural aspects of fracture and failure at elevated temperatures. Offered irregularly.—F. (F.)

#### **249. Mechanisms of Fatigue (3)**

Lecture—3 hours. Prerequisite: course 174 or consent of instructor; course 248 recommended. Microstructural description of the mechanisms of fatigue in metals. Topics include a phenomenological treatment of cyclic deformation, dislocation processes in cyclic deformation, fatigue crack nucleation, Stage I crack growth, threshold effects and high temperature cyclic deformation. Offered irregularly.—F. (F.)

#### **250A. Special Topics in Polymer and Fiber Science (3)**

Lecture—3 hours. Prerequisite: course 147 or consent of instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (Same course as Fiber and Polymer Science 250A.)—S. (S.)

#### **250B. Special Topics in Polymer and Fiber Science (3)**

Lecture—3 hours. Prerequisite: course 147 or consent of instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (Same course as Fiber and Polymer Science 250B.)—S. (S.)

#### **250C. Special Topics in Polymer and Fiber Science (3)**

Lecture—3 hours. Prerequisite: course 147 or consent of instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (Same course as Fiber and Polymer Science 250C.) Offered irregularly.—W. (W.)

#### **250D. Special Topics in Polymer and Fiber Science (3)**

Lecture—3 hours. Prerequisite: course 147 or consent of instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each

time the course is offered. (Same course as Fiber and Polymer Science 250D.) Offered irregularly.—W. (W.)

#### **250E. Special Topics in Polymer and Fiber Science (3)**

Lecture—3 hours. Prerequisite: course 147 or consent of instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (Same course as Fiber and Polymer Science 250E.) Offered irregularly.—F. (F.)

#### **250F. Special Topics in Polymer and Fiber Science (3)**

Lecture—3 hours. Prerequisite: course 147 or consent of instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (Same course as Fiber and Polymer Science 250F.) Offered irregularly.—W. (W.)

#### **251. Applications of Solid State Nuclear Magnetic Resonance Spectroscopy (3)**

Lecture—3 hours. Prerequisite: graduate standing in chemistry, physics or engineering, or consent of instructor. Fundamentals of solid state NMR spectroscopy and principles of advanced NMR techniques for analyzing structure of solid materials. Offered in alternate years.—S.

#### **260. Advanced Thermodynamics of Solids (4)**

Lecture/discussion—4 hours. Prerequisite: course 160. Thermodynamic principles, formalism and their application to solid materials. Specific examples from ceramic and solid state systems. Use of thermodynamic approach in developing understanding of constraints for processes in real systems. Offered in alternate years.—F. (F.)

#### **262. Advanced Topics in Structure of Materials (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 162; course 174 recommended; graduate standing in Engineering or consent of instructor. Nature of microstructure in engineering materials. Crystalline and non-crystalline structures, with special emphasis on grain boundary segregation in the development of polycrystalline microstructure and the radial distribution function of amorphous materials. Not open for credit to students who previously completed (cancelled) course 245.—F. (F.)

#### **264. Transport Phenomena in Materials Processes (4)**

Lecture/discussion—4 hours. Prerequisite: graduate standing in Engineering. Thermodynamic driving forces and atomic-scale mechanisms underlying diffusive mass transport and interface motion in materials. Nucleation, growth and coarsening dynamics of phase transformations. Not open for credit to students who previously completed course 240.—W. S. (W. S.)

#### **272. Advanced Functional Properties of Materials (4)**

Lecture/discussion—4 hours. Prerequisite: graduate standing in Physics, Chemistry, and Engineering. Fundamental physical properties of solid materials important to solid state devices, specifically electronic, magnetic, and optical properties. Topics include band structures, metals, superconductors, semiconductors, dielectrics, optical properties, and magnetic properties and implementation of these properties into devices. Offered irregularly.—F. (F.)

#### **274. Advanced Mechanical Properties of Materials (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 174. Comprehensive study of mechanical properties of materials, with special attention to dislocations and deformation and fracture control mechanisms. Mechanical properties of conventional engineering materials as well as advanced materials such as nanocrystalline solids and thin films are considered. Offered in alternate years.—W. (W.)

#### **282. Glass: Science and Technology (3)**

Lecture—2 hours; extensive writing—1 hour. Prerequisite: graduate standing in Chemistry, Physics or Engineering, or consent of instructor. Modern para-

digm in glass science and their applications to technologies. Relation of macroscopic properties of glasses and glass-forming liquids to atomic-level structures, including principles of formation, relaxation, transport phenomena, nucleation, crystallization and phase separation in glasses. Offered irregularly.—S. (S.)

#### **289A. Special Topics in Materials Science; Electronic Materials (1-5)**

Lecture/laboratory. Prerequisite: consent of instructor. Special topics in Electronic Materials. May be repeated for credit when topic differs. Offered irregularly.—F. W. S. (F. W. S.)

#### **289B. Special Topics in Materials Science; Electronic Materials (1-5)**

Lecture/laboratory. Prerequisite: consent of instructor. Special topics in Electronic Materials. May be repeated for credit when topic differs. Offered irregularly.—F. W. S. (F. W. S.)

#### **289C. Special Topics in Materials Science; Physics and Chemistry of Materials (1-5)**

Lecture/laboratory. Prerequisite: consent of instructor. Special topics in Physics and Chemistry of Materials. May be repeated for credit when topic differs. Offered irregularly.—F. W. S. (F. W. S.)

#### **289D. Special Topics in Materials Science; Materials Processing (1-5)**

Lecture/laboratory. Prerequisite: consent of instructor. Special topics in Materials Processing. May be repeated for credit when topic differs. Offered irregularly.—F. W. S. (F. W. S.)

#### **289E. Special Topics in Materials Science; Materials Science and Forensics (1-5)**

Lecture/laboratory. Prerequisite: consent of instructor. Special topics in Materials Science and Forensics. May be repeated for credit when topic differs. Offered irregularly.—F. W. S. (F. W. S.)

#### **289F. Special Topics in Materials Science; Biomaterials (1-5)**

Lecture/laboratory. Prerequisite: consent of instructor. Special topics in Biomaterials. May be repeated for credit when topic differs. Offered irregularly.—F. W. S. (F. W. S.)

#### **289G. Special Topics in Materials Science; Surface Chemistry of Metal Oxides (1-5)**

Lecture/laboratory. Prerequisite: consent of instructor. Special topics in Surface Chemistry of Metal Oxides. May be repeated for credit when topic differs. Offered irregularly.—F. W. S. (F. W. S.)

#### **290C. Graduate Research Conference (1)**

Discussion—1 hour. Prerequisite: consent of instructor. Individual and/or group conference on problems, progress, and techniques in materials science and engineering research. May be repeated for credit. (S/U grading only.)—F. W. S. (F. W. S.)

#### **294. Materials Science Seminar (1)**

Seminar—1 hour. Current literature and developments in materials science with presentations by individual students. May be repeated for credit. (S/U grading only.)—F. W. S. (F. W. S.)

#### **298. Group Study (1-5)**

Prerequisite: consent of instructor. Group study.—F. W. S. (F. W. S.)

#### **299. Research (1-12)**

Prerequisite: consent of instructor. Research. (S/U grading only.)—F. W. S. (F. W. S.)

#### **Professional**

#### **390. The Teaching of Materials Science (1)**

Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in materials science and engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (S/U grading only.)—F. W. S. (F. W. S.)

# Engineering: Mechanical and Aerospace Engineering

(College of Engineering)

C. P. (Case) van Dam, D. Engr., Chairperson of the Department

Benjamin D. Shaw, Ph.D., Vice Chairperson of the Department

**Department Office.** 2132 Bainer Hall  
530-752-0580; Fax 530-752-4158;  
<http://mae.ucdavis.edu>

## Faculty

Ralph C. Aldredge, III, Ph.D., Professor

Harry H. Cheng, Ph.D., Professor

Cristina E. Davis, Ph.D., Professor

Roger Davis, Ph.D., Professor

Jean-Pierre Delplanque, Ph.D., Professor

Raissa D'Souza, Ph.D., Professor (*Computer Science; Mechanical and Aerospace Engineering*)

Fidelis O. Eke, Ph.D., Professor

Paul A. Erickson, Ph.D., Associate Professor

Rida T. Farouki, Ph.D., Professor

Mohamed M. Hafez, Ph.D., Professor

*Academic Senate Distinguished Teaching Award*

Ronald A. Hess, Ph.D., Professor

Michael R. Hill, Ph.D., Professor

David A. Horsley, Ph.D., Professor

David Hwang, Ph.D., Professor

Niels G. Jensen, Ph.D., Professor

(Chemical Engineering and Materials Science;

Mechanical and Aerospace Engineering)

Sanjay S. Joshi, Ph.D., Associate Professor

Ian M. Kennedy, Ph.D., Professor

Zhaodan Kong, Ph.D., Assistant Professor

Valeria La Saponara, Ph.D., Associate Professor

Seongkyu Lee, Ph.D., Assistant Professor

Barbara S. Linke, Ph.D., Assistant Professor

Mark P. Modera, Ph.D., Professor (*Civil and Environmental Engineering; Mechanical and Aerospace Engineering*)

Jason Moore, Ph.D., Lecturer with Potential Security of Employment

Vinod Narayanan, Ph.D., Professor

Jae Wan Park, Ph.D., Assistant Professor

Bahram Ravani, Ph.D., Professor

Stephen K. Robinson, Ph.D., Professor

Nesrin Sarigul-Klijn, Ph.D., Professor

Benjamin D. Shaw, Ph.D., Professor

Masakazu Soshi, Ph.D., Assistant Professor

Spyros Tseregounis, Ph.D., Lecturer with Security of Employment (*Chemical Engineering and Materials Science; Mechanical and Aerospace Engineering*)

C. P. (Case) van Dam, D. Engr., Professor

Steven A. Velinsky, Ph.D., Professor

Anthony S. Wexler, Ph.D., Professor (*Civil and Environmental Engineering; Mechanical and Aerospace Engineering; Land, Air and Water Resources*)

Kazuo Yamazaki, Ph.D., Professor

## Emeriti Faculty

Hector A. Baldis, Ph.D., Professor Emeritus

James W. Baughn, Ph.D., Professor Emeritus

*Academic Senate Distinguished Teaching Award*

Charles W. Beadle, Ph.D., Professor Emeritus

Jean-Jacques Chattot, Ph.D., Professor Emeritus

Harry A. Dwyer, Ph.D., Professor Emeritus

Andrew A. Frank, Ph.D., Professor Emeritus

Jerald M. Henderson, Dr.Eng., Professor Emeritus

Myron A. Hoffman, Sc.D., Professor Emeritus

Mont Hubbard, Ph.D., Professor Emeritus

Maury L. Hull, Ph.D., Professor Emeritus

Dean C. Karnopp, Ph.D., Professor Emeritus

John D. Kemper, Ph.D., Professor Emeritus

Wolfgang Kollmann, Dr.Ing., Professor Emeritus

Donald L. Margolis, Ph.D., Professor Emeritus

Allan A. McKillop, Ph.D., Professor Emeritus  
Bruce R. White, Ph.D., Professor Emeritus

## Affiliated Faculty

James Schaaf, Ph.D., Lecturer

## The Mechanical and Aerospace Engineering Undergraduate Programs

The Department of Mechanical and Aerospace Engineering administers two undergraduate programs in the College of Engineering: (1) Mechanical Engineering, (2) Aerospace Science and Engineering.

For more information about our programs, please see <http://mae.ucdavis.edu/ug.php>.**Mission.** The Department of Mechanical and Aerospace Engineering is committed to educating future engineers so that they may contribute to the economic growth and well-being of the state, the nation, and the world, and to the advancement of knowledge in the mechanical and aerospace sciences.**Objectives.** The objectives of the programs offered in Mechanical and Aerospace Engineering include the following: to prepare its graduates to practice mechanical and/or aerospace engineering in a broad range of industries, to enable interested graduates to pursue graduate education, to prepare its graduates to participate in research and development, and in other creative and innovative efforts in science, engineering, and technology and to allow interested graduates to pursue entrepreneurial endeavors.**Preparatory Requirements.** In order to change to any major offered by the Department of Mechanical and Aerospace Engineering, students must:

- Be a registered student and have completed at least one quarter (minimum of 12 units) at UC Davis;
- Have completed not more than 135 cumulative units (excluding AP units);
- Be in good academic standing and meet minimum progress requirements;
- Have received a letter grade for all courses that satisfy Engineering degree requirements;
- Have: a) completed at least the following five courses: Mathematics 21A, B, C; Physics 9A and Chemistry 2A and b) have a GPA of 2.800 or better in all completed Mathematics, Physics, Biology and Chemistry courses required for your intended major, and have received a C- or better in each of these courses;
- Have no grade lower than a C in any completed engineering course required for your intended major(s) taken at UC Davis;
- Have a 2.800 UC GPA in completed engineering courses.

## Mechanical Engineering Undergraduate Program

The Mechanical Engineering program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.

The mechanical engineer uses basic science in the design and manufacture of complex engineering systems, requiring the application of physical and mechanical principles to the development of machines, energy conversion systems, materials, and equipment for guidance and control.

Work in this broad field of engineering requires a thorough knowledge of mathematics, physics, chemistry, material science, applied mechanics, thermodynamics, heat transfer, mass transfer, electricity, manufacturing processes, and economics.

The Mechanical Engineering program is designed to provide knowledge in mechanical engineering and associated applied sciences so that graduates may practice in a broad range of industries, pursue graduate studies, participate in research and development, and/or pursue entrepreneurial endeavors.

Engineering: Mechanical and Aerospace Engineering

## Areas of Interest

Students spend their third year in further study of fundamental courses, and in the fourth year they may tailor their studies to their interests by selecting courses in controls and systems analysis, fluid mechanics, heat transfer, mechanical design or thermodynamics. Students can either prepare for graduate study in mechanical engineering or obtain a broad background for entering engineering practice.

Students may select elective courses from among the areas of interest listed below.

**Mechanical Design.** The creation and improvement of products, processes, or systems that are mechanical in nature are the primary activities of a professional mechanical engineer. The development of a product from concept generation to detailed design, manufacturing process selection and planning, quality control and assurance, and life cycle considerations are areas of study and specialization in the area of mechanical design.

Solutions to such major social problems as environmental pollution, the lack of mass transportation, the lack of raw materials, and energy shortages, will depend heavily on the engineer's ability to create new types of machinery and mechanical systems.

The engineer-designer must have a solid and relatively broad background in the basic physical and engineering sciences and have the ability to synthesize the information from such a background in creative problem solving. In addition to having technical competence, the designer must be able to consider the socioeconomic consequences of a design and its possible impact on the environment. Product safety, reliability, and economics are other considerations.

Suggested technical electives:

Aerospace Science and Engineering 133,  
139Biological Systems Engineering 114, 120,  
165Biomedical Engineering 118/Electrical and  
Computer Engineering 147Engineering 122, 160 (only one unit of credit  
towards Technical Electives requirement)Materials Science and Engineering 180,  
181, 182Mechanical Engineering 121, 134, 150B,  
151, 152, 154, 161, 163**Suggested Advisers.** H.H. Cheng, R.T. Farouki, M.R. Hill, B.S. Linke, B. Ravani, M. Soshi, S. Velinsky, K. Yamazaki**Biomedical and Engineering Fluid Mechanics.** This field of study is based on the fundamentals of fluid mechanics and their broad range of applications in the biomedical and engineering areas.

Areas of current research include blood circulation and its potential role in the regulation of normal physiological function and in the development of disease; groundwater and atmospheric flows and their implications for pollutant transport and environmental concerns; aerodynamic flow around transportation vehicles and its impact on vehicle performance; and flow in combustion engines and other energy systems with considerations of efficiency and environmental impact. These areas are investigated both experimentally and computationally.

Suggested technical electives:

Aerospace Science and Engineering 138  
Engineering 160 (only one unit of credit  
towards technical requirements)

Chemical Engineering 161A, 161B

Civil and Environmental Engineering 144,  
149

Mechanical Engineering 161, 163

**Suggested Advisers.** R.C. Aldredge, M. Hafez, I.M. Kennedy, S.K. Robinson, B.D. Shaw, C.P. van Dam, A.S. Wexler**Combustion and the Environment.** Combustion is widely used for energy generation, propulsion, heating, and waste disposal, as well as for

many other applications. Mechanical engineers are often heavily involved with the design of combustion systems (internal combustion engines, gas turbines, furnaces, etc.) and deal with aspects of combustion ranging from increasing efficiencies to reducing pollutant emissions. This specialization is for those who would like to work in fields that use combustion, or that deal with pollution related to combustion. With the current increased emphasis on reducing pollutants while maintaining or increasing efficiency, the efforts of mechanical engineers in designing and improving combustion systems are becoming more important.

#### Suggested technical electives:

- Mechanical Engineering 161, 163
- Civil and Environmental Engineering 149, 150

**Suggested Advisers.** R.C. Aldredge, R. Davis, P.A. Erickson, I.M. Kennedy, B.D. Shaw

#### Heat Transfer, Thermodynamics, and Energy Systems.

This specialization emphasizes the fundamentals of heat transfer and thermodynamics, and their application to the design of advanced engineering systems. The objective of the program is to introduce students to the fundamental processes of heat transfer and thermodynamics in complex engineering systems so that they are able to design more efficient, cost effective, and reliable systems with less environmental pollution and impact. An understanding of heat transfer and thermodynamics is required for the design of efficient, cost-effective systems for power generation, propulsion, heat exchangers, industrial processes, refining, and chemical processing. This area of specialization is important to many industries— aerospace, defense, automotive—as well as to the thermal design of electronic and computer packages.

#### Suggested technical electives:

- Aerospace Science and Engineering 138
- Mechanical Engineering 161, 163

**Suggested Advisers.** R.C. Aldredge, R. Davis, P.A. Erickson, I.M. Kennedy, J.W. Park, B.D. Shaw

**Manufacturing.** Manufacturing is concerned with the conversion of raw materials into finished products by a variety of processes, such as machining, forming, casting, and molding. Modern manufacturing technology is increasingly dependent upon integration with computer-aided design systems and precision computer controls. State-of-the-art laboratories offer the opportunity for hands-on experience with a wide spectrum of manufacturing equipment. Manufacturing engineers must have expertise in design, materials, controls, statistical methods, computer software, and microprocessor applications.

#### Suggested technical electives:

- Biomedical Engineering 118/Electrical and Computer Engineering 147
- Electrical and Computer Engineering 160
- Materials Science and Engineering 180, 181
- Mechanical Engineering 150B, 151, 154

**Suggested Advisers.** H.H. Cheng, R.T. Farouki, B.S. Linke, D.A. Horsley, V. La Saponara, M. Soshi, B. Ravani, K. Yamazaki

**System Dynamics and Control.** Engineers are increasingly concerned with the performance of integrated dynamics systems in which it is not possible to optimize component parts without considering the overall system.

System dynamics and control specialists are concerned with the modeling, analysis, and simulation of all types of dynamic systems and with the use of automatic control techniques to change the dynamic characteristics of systems in useful ways. The emphasis in this program is on the physical systems that are closely related to mechanical engineering, but the techniques for studying these systems apply to social, economic, and other dynamic systems.

Ongoing research includes projects on continuously variable transmissions, active and semi-active suspension systems, modeling and control of vehicle dynamics, electromechanical actuator design, elec-

tronically controlled steering, the analysis of fuel management systems, and the design of flight-control systems with humans in the loop.

#### Suggested technical electives:

- Aerospace Science and Engineering 129, 139, 141
- Electrical and Computer Engineering 160
- Engineering 122
- Mechanical Engineering 121, 134, 154

**Suggested Advisers.** F.O. Eke, R.A. Hess, S. Joshi

**Ground Vehicle Systems.** An important aspect of mechanical engineering is the design of more environmentally benign surface vehicles that provide efficient individual and public transportation. Innovations in the field require competence in vehicle dynamics, control of vehicle dynamics, power sources and power transmission, lightweight structures and systems, alternatively fueled power systems, including electrical drives and fuel cells, and mechanical systems.

#### Suggested technical electives:

- Aerospace Science and Engineering 127, 129, 139
- Civil and Environmental Engineering 130, 149, 160
- Engineering 122, 160 (only one unit of credit towards Technical Electives requirement)
- Mechanical Engineering 121, 134, 152

**Suggested Advisers.** P. A. Erickson, M. Hill, J. Park, N. Sarigul-Klijn, S. Velinsky

**Transportation Systems.** As society recognizes the increasing importance of optimizing transportation systems to minimize environmental degradation and energy expenditure, engineers will need to consider major innovations in the way people and goods are moved. Such innovations will require competence in vehicle dynamics, propulsion and control, and an understanding of the problems caused by present-day modes of transportation. Vehicle control requires an understanding of sensors and actuators, and the integration of yet-to-be-proposed concepts into overall vehicular dynamics. Competence in these areas allows for the development of alternative propulsion concepts, such as electric, hybrid, and fuel cell.

#### Suggested technical electives:

- Aerospace Science and Engineering 127, 129
- Biological Systems Engineering 114, 120
- Civil and Environmental Engineering 131, 149
- Engineering 122, 160 (only one unit of credit towards Technical Electives requirement)
- Mechanical Engineering 134, 150B, 161, 163

**Suggested Advisers.** P.A. Erickson, J.W. Park, S. Velinsky

## Mechanical Engineering Program Requirements

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

Exclusive of General Education units, the minimum number of units required for the Mechanical Engineering major is 159.

#### Lower Division Required Courses

	UNITS
Mathematics 21A-21B-21C-21D	16
Mathematics 22A-22B	6
Physics 9A-9B-9C-9D	19
Chemistry 2A-2B or 2AH-2BH	10
Engineering 4	3
Engineering 6 or Mechanical	
Engineering 5	4
Engineering 17, 35, 45 (or 45Y)	12
Mechanical Engineering 50	4

English 3 or University Writing Program 1, 1Y or 1V, or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5 (grade of C- or better is required) ..... 4  
Communication 1 or 3 ..... 4

#### Upper Division Required Courses

Engineering 100, 102, 103, 104, 105, 190	22
Mechanical Engineering 106, 108, 109, 150A, 165, 172	24
Mechanical Engineering 185A & 185B (taken in consecutive quarters), or Aerospace Science and Engineering 130A & 130B	8
Select one course from the following Applied Mathematics Electives: Chemical Engineering 140, Civil & Environmental Engineering 114, Computer Science Engineering 130, Engineering 180, Mathematics 118A, 128A, 128B, Mechanical Engineering 115, 151, Statistics 130A, 131A	4
Select one course from the following System Dynamics/Mechanical Design Electives: Engineering 122, Mechanical Engineering 121, 139, 150B, 154 or 171	4
Select two courses from the following Restricted Electives: Aerospace Science and Engineering 129, 138, 140, 141, 142; Engineering 122, 188, Materials Science and Engineering 180, 182; Mechanical Engineering 134, 152, 161, 163, 164. Students may also choose from Aerospace Science and Engineering 130A, 130B, Mechanical Engineering 121, 139, 150B, 151, 154, 171 if these courses are not used in satisfaction of other degree requirements	
Technical Elective Requirement	7

At least four units must be taken from any Upper Division Engineering course, which may include courses from the above System Dynamics/Mechanical Design or Restricted Elective lists if these courses are not used in satisfaction of other degree requirements. Up to 4 units may be selected from Mechanical Engineering 185A/B or any engineering 192, 199 not used in satisfaction of other degree requirements. Courses that cannot be used are Biomedical Engineering 110L, Engineering 160, 191, 198 (Gearing up for Graduate School/undergraduate research), Computer Science Engineering 188 or any 197T course.

Up to three units may be used from the following technical electives list:  
Agricultural and Resource Economics 100A, 100B, 112  
Applied Biological Systems Technology 101, 142, 165  
Atmospheric Science 149, 160  
Biological Sciences 2A, 2B, 2C  
Chemistry 2C, 2CH, 8A, 8B and any upper division course except Chemistry 195 and 197

Economics 100, 101, 102, 103, 122  
Engineering: Any upper division course offered in the college of engineering except Biomedical Engineering 110L, Engineering 160, 191, 198 (Gearing Up for Grad School/Undergraduate Research), Computer Science Engineering 188 or any 197T course

Environmental and Resource Sciences 100, 100L, 121, 131, 136, 185, 186, 186L

Exercise Biology 102  
Fiber and Polymer Science 100 (same as Materials Science Engineering 147)

Food Science and Technology 159, 160  
Geology 17, 32, 35, 36, 50, 50L, 60, 100, 100L, 101, 101L, 130, 131, 160, 162, 163

Hydrologic Science 110, 124, 134, 141, 142, 143, 144, 146, 151, 182

Management 11A, 11B, 100, 120, 140, 150, 160, 170, 180

Mathematics: any upper division course except Mathematics 197TC  
 Physics 9HE and any upper division course except Physics 160 (restricted to one unit of technical elective), 195, 197T  
 Statistics: any upper division course except Statistics 100, 102, 103, 104, 106, 108  
 Upper Division Composition  
 Requirement ..... 0 or 4  
 One course from the following (a grade of C- or better is required): University Writing Program 101, 102E, 104A, 104E, 104T or passing the Upper-Division Composition Exam.

## Division of Aerospace Science and Engineering

The Division of Aerospace Science and Engineering administers the Aerospace Science and Engineering Program within the Department of Mechanical and Aerospace Engineering.

### Faculty

Roger Davis, Ph.D., Professor  
 Jean-Pierre Delplanque, Ph.D., Professor  
 Fidelis O. Eke, Ph.D., Professor  
 Mohamed M. Hafez, Ph.D., Professor  
*Academic Senate Distinguished Teaching Award*  
 Ronald A. Hess, Ph.D., Professor  
 Sanjay S. Joshi, Ph.D., Associate Professor  
 Valeria La Saponara, Ph.D., Assistant Professor  
 Stephen K. Robinson, Ph.D., Professor  
 Nesrin Sarigul-Klijn, Ph.D., Professor  
 C. P. (Case) van Dam, D. Engr., Professor

## The Aerospace Science & Engineering Undergraduate Program

The Aerospace Science and Engineering program is accredited by the Engineering Accreditation Commission of ABET; <http://www.abet.org>.

Aerospace Science and Engineering majors learn to apply the principles of the physical sciences and engineering to the design of aerospace vehicles. Specific objectives include the design, development and manufacture of aerospace vehicles and other transportation systems through the integration of disciplines associated with aerodynamics, propulsion, structures and guidance/control.

Our Bachelor of Science degree in Aerospace Science and Engineering provides a broad background and fundamental education in mathematics, the physical sciences, and the engineering sciences. These fundamentals, when complemented by the required technical courses, prepare students for employment in government or industry, while simultaneously establishing an excellent foundation for graduate studies.

Students are encouraged to adhere carefully to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

Exclusive of General Education units, the minimum number of units required for the Aerospace Science and Engineering major is 163.

### Lower Division Required Courses

	UNITS
Mathematics 21A-21B-21C-21D .....	16
Mathematics 22A-22B .....	6
Physics 9A-9B-9C-9D .....	19
Chemistry 2A-2B or 2AH-2BH.....	10
Engineering 4 .....	3
Engineering 6 or Mechanical Engineering 5.....	4
Engineering 17, 35, 45 (or 45Y) .....	12
English 3 or University Writing Program 1, 1Y or 1V, or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5 (grade of C- or better is required) .....	4
Communication 1 or 3 .....	4

### Upper Division Required Courses

Engineering 100, 102, 103, 104, 105, 190.....	22
Mechanical Engineering 106, 108, 109, 165, 172.....	20
Aerospace Science and Engineering 127, 129, 130A, 130B, 133, 135, 138 .....	28
Select one course from: Engineering 180, Mechanical Engineering 115 or Mathematics 128C .....	4
Technical electives .....	12

One course must be chosen from the following aeronautics electives: Aerospace Science and Engineering 140, 141 or 142  
 The remaining units must be taken from:  
 EME 139 or EAE 126 or from the above Aeronautics Electives list if not used in satisfaction of other degree requirements.  
 Up to 4 units may be selected from any upper-division engineering course including any engineering 192 or 199 not used in satisfaction of other degree requirements.  
 Courses that cannot be used are Biomedical Engineering 110L, Engineering 160, Computer Science Engineering 188 or any 197T course.

### Upper Division Composition

Requirement ..... 0 or 4  
 One course from the following (grade of C- or better is required): University Writing Program 101, 102E, 104A, 104E, 104T or passing the Upper-Division Composition Exam.

## The Graduate Program in Mechanical and Aeronautical Engineering

M.S. and Ph.D.  
 530-752-0581

The defining element of graduate study in the Mechanical and Aeronautical Engineering Program is interdisciplinary design. Research within this graduate program advances design in diverse fields such as vehicles, plasma MHD propulsion, biomechanics, aerostructures, sensors, combustion, and energy systems. Graduate students acquire skills both to address fundamental issues in these areas and to design complex, multi-component systems. The highly collaborative environment fosters multidisciplinary research while drawing on the study of mathematics, experimental and space plasma science, electrical engineering, materials science, materials modeling, molecular dynamics and numerical analysis, bioengineering, space physics, and nanotechnology in addition to the core areas. Recruiters from industry are active here, knowing that, in addition to having hands-on design experience, our students are well grounded in engineering fundamentals. They study with professors who "wrote the book" on their discipline, and work on design projects with researchers who are international authorities in their field. Our graduate students are able to work closely with faculty in a friendly but demanding environment where teamwork and faculty mentoring are important, as is the cross-disciplinary, collaborative culture that is unique to UC Davis.

### Research Highlights:

- Aeronautics and aerostructures
- Spacecraft design and operation
- Space environmental studies
- Remote sensing
- Electrical propulsion
- Flight dynamics and control
- Computational fluid dynamics
- Experimental MHD turbulence studies
- Dynamic systems and controls
- Robotics
- Materials modeling
- Manufacturing and Mechanical design
- Reacting flows

- Heat transfer
- Automotive system dynamics
- Biosensors/Microelectromechanical Systems (MEMS)
- Molecular self-assembly
- Radiation effects in solids
- Nonlinear dynamics and phase-locking
- Biofluid mechanics
- Biosolid mechanics
- Sports biomechanics
- Energy Systems/Fuel Cell/Hybrid Vehicle Technology
- High energy density science and applications
- Nuclear fusion energy
- Wind energy

### Research Facilities and Partnerships:

- Center for Computational Fluid Dynamics
  - Institute of Transportation Studies
  - Center for Advanced Highway Maintenance and Construction Technology
  - GATE Center for Hybrid Electric Vehicles
  - Aeronautical Wind Tunnel Facility
- Complete Information on our website at [http://mae.ucdavis.edu/grad\\_studies/](http://mae.ucdavis.edu/grad_studies/).

## Courses in Engineering: Mechanical (EME)

Courses in Mechanical Engineering (EME) are listed below; courses in Aerospace Science and Engineering (EAE) are listed immediately following; graduate courses in Mechanical and Aeronautical Engineering (MAE) follow.

### Lower Division

#### 1. Mechanical Engineering (1)

Lecture—1 hour. Description of the field of mechanical engineering with examples taken from industrial applications, discussions of the practice with respect to engineering principles, ethics, and responsibilities. (P/NP grading only.) —F. (F.)

#### 5. Computer Programming for Engineering Applications (4)

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 16A or 21A (may be taken concurrently). Structured programming in C for solving problems in engineering. Introduction to MATLAB and comparison study of C/C++ with MATLAB. Not open for credit to students who have completed course 124. GE credit: QL, SE, SL, VL.—F. (F.) Cheng

#### 50. Manufacturing Processes (4)

Lecture/discussion—3 hours; laboratory—3 hours. Prerequisite: C- or better in: Engineering 4 and Physics 9A. Restricted to Mechanical Engineering and Mechanical Engineering/Materials Science Engineering majors. Modern manufacturing methods, safety, manufacturing instructions, computer-aided manufacturing and their role in the engineering design and development process. GE credit: SciEng | QL, SE, VL.—F, W, Su. (F, W, Su.) Farouki, Linke, Soshi

#### 92. Internship in Mechanical Engineering (1-5)

Internship. Prerequisite: lower division standing; approval of project prior to period of internship. Supervised work-study experience in engineering. May be repeated for credit. (P/NP grading only.)

#### 97C. Mentoring and Tutoring Engineering in the Community (1-4)

Prerequisite: consent of instructor. Mentoring, coaching, tutoring and/or supervision of students in K-12 schools in Engineering-related topics. May be repeated for credit. (P/NP grading only.)

#### 99. Special Study for Undergraduates (1-5)

Prerequisite: consent of instructor; lower division standing. (P/NP grading only.)

**Upper Division****106. Thermo-Fluid Dynamics (4)**

Lecture—4 hours. Prerequisite: C- or better in Engineering 103 and 105. Restricted to Mechanical Engineering, Aerospace Science and Engineering, and Mechanical Engineering/Materials Science Engineering majors. Inviscid incompressible flow, compressible flow, ideal gas mixtures, psychrometrics, reacting mixtures and combustion. GE credit: SciEng | SE.—F, W, S. (F, W, S.) Aldredge, Kennedy, Park

**108. Measurement Systems (4)**

Lecture—2 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: C- or better in Engineering 100 and Engineering 102; Engineering 104 recommended. Restricted to Mechanical Engineering, Aerospace Science & Engineering and Mechanical/Materials Science & Engineering. Stability of flexible systems. Introduction to fluid-structure interaction. Mechanical vibrations. Experiments to illustrate principles of mechanical systems. Theory of measurements; Signal analysis; Demonstration of basic sensors for mechanical systems; Experimental project design; Experiments involving voltage measurement; strain gauges, dynamic systems of 0th, 1st and 2nd order. Three units of credit for students who have previously taken Biomedical Engineering 111; two units of credit for students who have previously taken Biological Systems Engineering 165; one unit of credit allowed for students who have completed course 107B (former version of course 108). GE credit: SciEng | QL, SE, VL, WE.—F, W, S. (F, W, S.) Erickson, Hill, Horsley, La Saponara

**109. Experimental Methods for Thermal Fluids (4)**

Lecture—2 hours; laboratory—1.5 hours; discussion—1 hour; extensive writing. Prerequisite: grade of C- or better in course 106. Restricted to Mechanical Engineering, Aerospace Science & Engineering and Mechanical/Materials Science Engineering Majors. Experiments to illustrate principles of thermal-fluid systems. Statistical and uncertainty analysis of data; statistical design of experiments; measurement devices; experiments involving thermodynamic cycles, combustion, compressible and incompressible flows. Not open for credit to students who have completed Chemical Engineering 150A. GE credit: SciEng | QL, SE, VL.—F, W, S. (F, W, S.) Aldredge, Davis, Delplanque, Hwang, Kennedy, Robinson

**115. Introduction to Numerical Analysis and Methods (4)**

Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: C- or better in: Engineering 6 or course 5 or Computer Science Engineering 30 or Chemical and Materials Science Engineering 6; C- or better in: Mathematics 21A, 21B, 21C, 21D, 22A, 22B; C- or better in: Physics 9A, 9B, 9C. Number representation, Taylor expansions, error and stability analysis, roots of nonlinear equations, sets of linear equations, numerical integration, ordinary differential equations. Not open for credit to students who have taken Applied Science Engineering 115. GE credit: SciEng | SE.—F, W. (F, W.) Jensen

**121. Engineering Applications of Dynamics (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: C- or better in Engineering 102; C- or better in Engineering 6 or course 5 or Computer Science Engineering 30. Restricted to Mechanical Engineering, Aerospace Science and Engineering, and Mechanical Engineering/Materials Science Engineering majors. Technical elective that revisits dynamic principles with emphasis on engineering applications; stressing importance of deriving equations of motion and setting these into format for computer solution with computer simulation lab, students gain experience with solving complex, real engineering applications. GE credit: SciEng | QL, SE, SL, VL.—S. (S.) Margolis

**134. Vehicle Stability (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: C- or better in Engineering 102. Restricted to Mechanical Engineering, Aerospace Science and

Engineering, and Mechanical Engineering/Materials Science Engineering majors. Introduction to the static and dynamic stability characteristics of transportation vehicles with examples drawn from aircraft, high-performance automobiles, rail cars and boats. Laboratory experiments illustrate the dynamic behavior of automobiles, race cars, bicycles, etc. GE credit: SciEng | QL, SE.—S. (S.) Karnopp

**139. Stability of Flexible Dynamic Systems (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: grade of C- or better in Engineering 102 and 103. Stability of flexible systems. Introduction to fluid-structure interaction. Mechanical vibrations. Design of mechanical subsystems or systems under constraints. Dynamic instabilities. Flutter. Control effectiveness. Energy extraction from fluid-structure interactions. Design applications to aerospace, mechanical and biomedical systems. No credit for students who have completed Aerospace Science and Engineering 139. GE credit: SciEng | SE.—S. (S.) Sarigul-Klijn

**150A. Mechanical Design (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: C- or better in: Engineering 45 or Engineering 45Y; C- or better in both Engineering 104 and course 50 (may be taken concurrently). Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering majors. Principles of engineering mechanics applied to mechanical design. Theories of static and fatigue failure of metals. Design projects emphasizing the progression from conceptualization to hardware. Experimental stress analysis and mechanical measurements using strain gages. GE credit: SciEng | QL, SE, VL, WE.—F, S, Su. (F, S, Su.) Hill, Moore, Ravani, Schaaf

**150B. Mechanical Design (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: C- or better in course 150A. Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Principles of engineering mechanics applied to the design and selection of mechanical components. Design projects, which concentrate on conceptual design, engineering analysis, methods of manufacture, material selection, and cost. Introduction to Computer-Aided Design. GE credit: SciEng | QL, SE, VL.—W, S. (W, S.) Farouki, Linke

**151. Statistical Methods in Design and Manufacturing (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: C- or better in course 150A. Restricted to Restrictions on Enrollment Text: Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Methods of statistical analysis with emphasis on applications in mechanical design and manufacturing. Applications include product evaluation and decision making, stress-strength interference, probabilistic design, systems reliability, and fatigue under random loading. GE credit: SciEng | QL, SE, VL.—W. (W.) C. Davis

**152. Computer-Aided Mechanism Design (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: C- or better in Engineering 102; C- or better in course 5 or Engineering 6 or Computer Science Engineering 30. Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Principles of computer-aided mechanism design. Computer-aided kinematic, static, and dynamic analysis and design of planar mechanisms such as multiple-loop linkages and geared linkages. Introduction to kinematic synthesis of mechanisms. Offered in alternate years. GE credit: SciEng | QL, SE, VL.—(F) Cheng

**154. Mechatronics (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: C- or better in each of the following: Engineering 100 and Engineering 102 and course 50. Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Mechatronics system concept

and overview, control system design ware architecture, microcontroller and interface technology for mechatronics control, sensor for mechatronics systems, actuator drives. GE credit: SciEng | QL, SE, VL.—S. (S.) Yamazaki

**161. Combustion and the Environment (4)**

Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: grade of C- or better in course 106. Introduction to combustion kinetics; the theory of premixed flames and diffusion flames; turbulent combustion; formation of air pollutants in combustion systems; examples of combustion devices which include internal combustion engines, gas turbines, furnaces and waste incinerators; alternative fuel sources. GE credit: SciEng | QL, SE, VL.—W. (W.) Shaw

**163. Internal Combustion Engines and Future Alternatives (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: C- or better in course 50 and course 106. Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Fundamentals of internal combustion engine design and performance. Future needs to adapt to environmental concerns, and the feasibility of better alternatives in the future. GE credit: SciEng | QL, SE, VL.—F. (F.) Erickson, Park

**164. Introduction to Heating, Ventilation and Air Conditioning Systems (4)**

Lecture—4 hours. Prerequisite: C- or better in both course 106 and 165. Introduction to basic mechanisms and processes associated with heating, ventilation and air conditioning (HVAC), including equipment and systems used for HVAC in residential and commercial buildings. Only 2 units for students who have completed Civil and Environmental Engineering 125. Offered in alternate years. GE credit: SciEng | SE.—W. Modera

**165. Heat Transfer (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: C- or better in course 5 or Engineering 6 or Computer Science Engineering 30; C- or better in Engineering 103 and 105. Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Conduction, convection, and radiation heat transfer. Computational modeling of heat transfer in engineering. Applications to engineering equipment with the use of digital computers. GE credit: SciEng | QL, SE, VL.—F, S, Su. (F, S, Su.) R. Davis, Narayanan, Shaw

**171. Analysis, Simulation and Design of Mechatronic Systems (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: C- or better in Engineering 100 and 102. Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Modeling of dynamic engineering systems in various energy domains. Analysis and design of dynamic systems. Response of linear systems. Digital computer simulation and physical experiments. GE credit: SciEng | QL, SE, VL.—F, W. (F, W.) Assadian, Horsley, Karnopp

**172. Automatic Control of Engineering Systems (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: C- or better in Engineering 100 and 102. Restricted to Mechanical Engineering, Aerospace Science and Engineering, Mechanical Engineering/Materials Science and Engineering. Classical feedback control; block diagrams; control systems performance specifications; steady state errors; rise and settling times; root locus; PID controllers; control design with Bode and Nyquist plots; stability; phase and gain margin; lead and lag compensators; state variable feedback controllers. GE credit: SciEng | QL, SE, VL.—F, W, S, Su. (F, W, S, Su.) Eke, Horsley, Joshi

**185A. Mechanical Engineering Systems Design Project (4)**

Lecture—1 hour; laboratory—3 hours. Prerequisite: C- or better in: course 150A and course 165 (may be taken concurrently); Communications 1 or 3 recommended; upper division composition recommended. Restricted to Senior standing in Mechanical

Engineering (EMEC). Major mechanical engineering design experience; the mechanical engineering design process and its use in the design of engineering systems incorporating appropriate engineering standards and multiple realistic constraints. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | OL, QL, SE, VL, WE. —W. (W.) C. Davis, Velinsky, Moore

### **185B. Mechanical Engineering Systems Design Project (4)**

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 185A and senior standing in the Department of Mechanical and Aerospace Engineering. Major mechanical engineering design experience; the mechanical engineering design process and its use in the design of engineering systems incorporating appropriate engineering standards and multiple realistic constraints. (Deferred grading only, pending completion of sequence.) GE credit: Sci | OL, QL, SE, VL, WE. —S. (S.) Velinsky, C. Davis, Moore, Robinson

### **189A. Selected Topics in Mechanical Engineering; Energy Systems and the Environment (1-5)**

Prerequisite: consent of instructor. Directed group study in Energy Systems and the Environment. May be repeated for credit when the topic is different. Offered irregularly.

### **189B. Selected Topics in Mechanical Engineering; Engineering Controls (1-5)**

Prerequisite: consent of instructor. Directed group study in Engineering Controls. May be repeated for credit when the topic is different. Offered irregularly.

### **189C. Selected Topics in Mechanical Engineering; Engineering Dynamics (1-5)**

Prerequisite: consent of instructor. Directed group study in Engineering Dynamics. May be repeated for credit when the topic is different. Offered irregularly.

### **189D. Selected Topics in Mechanical Engineering; Biomechanics (1-5)**

Prerequisite: consent of instructor. Directed group study in Biomechanics. May be repeated for credit when the topic is different. Offered irregularly.

### **189E. Selected Topics in Mechanical Engineering; Fluid Mechanics (1-5)**

Prerequisite: consent of instructor. Directed group study in Fluid Mechanics. May be repeated for credit when the topic is different. Offered irregularly.

### **189F. Selected Topics in Mechanical Engineering; Manufacturing Engineering (1-5)**

Prerequisite: consent of instructor. Directed group study in Manufacturing Engineering. May be repeated for credit when the topic is different. Offered irregularly.

### **189G. Selected Topics in Mechanical Engineering; Mechanical Engineering and Product Design (1-5)**

Prerequisite: consent of instructor. Directed group study in Mechanical Engineering and Product Design. May be repeated for credit when the topic is different. Offered irregularly.

### **189H. Selected Topics in Mechanical Engineering; Mechatronics Systems (1-5)**

Prerequisite: consent of instructor. Directed group study in Mechatronics Systems. May be repeated for credit when the topic is different. Offered irregularly.

### **189I. Selected Topics in Mechanical Engineering; MEMS/Nanotechnology (1-5)**

Prerequisite: consent of instructor. Directed group study in MEMS/Nanotechnology. May be repeated for credit when the topic is different. Offered irregularly.

### **189J. Selected Topics in Mechanical Engineering; Solid and Structural Mechanics (1-5)**

Prerequisite: consent of instructor. Directed group study in Solid and Structural Mechanics. May be repeated for credit when the topic is different. Offered irregularly.

### **189K. Selected Topics in Mechanical Engineering; Thermodynamics (1-5)**

Prerequisite: consent of instructor. Directed group study in Thermodynamics. May be repeated for credit when the topic is different. Offered irregularly.

### **189L. Selected Topics in Mechanical Engineering; Vehicle and Transportation Systems (1-5)**

Prerequisite: consent of instructor. Directed group study in Vehicle and Transportation Systems. May be repeated for credit when the topic is different. Offered irregularly.

### **192. Internship in Engineering (1-5)**

Internship. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work experience in mechanical engineering. May be repeated for credit. (P/NP grading only.)

### **197TC. Mentoring and Tutoring Engineering in the Community (1-4)**

Prerequisite: upper division standing; consent of instructor. Mentoring, coaching, tutoring and/or supervision of students in K-12 schools in Engineering-related topics. May be repeated for credit. (P/NP grading only.)

### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

## **Courses in Aerospace Science and Engineering (EAE)**

### **Lower Division**

#### **1. Introduction to Aerospace Science Engineering (1)**

Lecture—1 hour. Description of the field of aerospace engineering with examples from industry, government, and research. Aerospace engineering principles, ethics, and responsibilities. (P/NP grading only.) —F. (F.)

#### **10. From the Wright Brothers to Drones and Quadcopters (2)**

Lecture—2 hours. History of aircraft and its influence on society. Topics covered will include Unmanned Aerial Vehicles, safety considerations, economics and privacy issues. Aerodynamics, stability and control will also be introduced. (P/NP grading only.) GE credit: SciEng or SocSci | SE or SS.—Su. (Su.)

#### **99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor and lower division standing. (P/NP grading only.)

### **Upper Division**

#### **126. Theoretical and Computational Aerodynamics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: C- or better in course 127; C- or better in Engineering 180 or Applied Science Engineering 115 or Mechanical Engineering 115 or Mathematics 128C. Development of general equations of fluid motion. Study of flow field kinematics and dynamics. Flow about a body. Thin airfoil theory. Viscous effects. Applications of numerical methods to wing analysis and design. GE credit: SciEng | SE.—S. Hafez

#### **127. Applied Aircraft Aerodynamics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: grade of C- or better in Mechanical Engineering 106. Experimental characteristics of wing sections. High-lift devices. Lift and drag at high Mach numbers. Drag aerodynamics. Total aircraft drag estimation. Aerodynamic design procedures. GE credit: QL, SE, SL, WE. —F. (F.) Robinson

#### **129. Stability and Control of Aerospace Vehicles (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: grade of C- or better in Engineering 102. Restricted to upper division standing. Aircraft and spacecraft stability and control. Derivation of fundamental

equations of motion for aircraft/spacecraft. Specialization of equations for aircraft. Fundamentals of feedback. Aircraft flight control systems. Specialization of equations of motion for orbiting spacecraft. Spacecraft attitude control systems. GE credit: QL, SE. —W. (W.) Hess, Kong

### **130A. Aircraft Performance and Design (4)**

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: C- or better in course 127; C- or better in course 129 (may be taken concurrently). Major aircraft design experience with multiple realistic constraints including aerodynamics, performance analysis, weight estimation, stability and control, and appropriate engineering standards. GE credit: SciEng | SE, QL, VL.—W. (W.) van Dam

### **130B. Aircraft Performance and Design (4)**

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: grade of C- or better in course 130A. Restricted to upper division standing. Major aircraft design experience incorporating multiple realistic constraints including: refinement and iteration of initial design; cost analysis, detailed design, and analysis of aircraft structure; propulsion system; aerodynamics, stability, and control/handling qualities; manufacturing; or appropriate engineering standards. GE credit: OL, SE, SL, VL, WE.—S. (S.) van Dam

### **133. Finite Element Methods in Structures (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisites: grade of C- or better in Engineering 104. Open to College of Engineering Students. Introduction to the aerospace structural design process. History of aircraft and spacecraft materials. Effects of loading beyond elastic limit. Deflections and stresses due to combined loading. Virtual work principles, and finite element methods. Applications to aerospace structures. GE credit: SE. —F. (F.) Sarigul-Klijn

### **135. Aerospace Structures (4)**

Lecture—4 hours. Prerequisite: C- or better in Engineering 104; course 126 or 127 recommended. Analysis and design methods used in aerospace structures. Shear flow in open, closed and multicell beam cross-sections, buckling of flat and curved sheets, tension field beams, local buckling. GE credit: SciEng | QL, SE.—W. (W.) La Saponara

### **137. Structural Composites (4)**

Lecture—3 hours; laboratory—1 hour. Prerequisite: grade of C- or better in Engineering 104. Overview of materials and technology for creating structures from fiber reinforced resin matrix composite material systems. Elementary design analysis and case studies emphasizing aeronautical applications. GE credit: SE.—La Saponara

### **138. Aircraft Propulsion (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: C- or better in Mechanical Engineering 106. Analysis and design of modern aircraft gas turbine engines. Development and application of cycle performance prediction techniques for important engine configurations. Introduction to the operation and design of inlets, compressors, burners, turbines, and nozzles. Cycle design studies for specific applications. GE credit: SciEng | QL, SE.—W. (W.) R. Davis

### **140. Rocket Propulsion (4)**

Lecture—4 hours. Prerequisite: C- or better in Mechanical Engineering 106. Restricted to upper division standing. Fluid and thermodynamics of rocket engines, liquid and solid rocket propulsion. Space propulsion concepts and space mission requirements. Not open for credit to students who have taken identical course 189A prior to Fall Quarter 2013. GE credit: SciEng | SE.—S. (W.) R. Davis, Delplanque

### **141. Space Systems Design (4)**

Lecture—2 hours; discussion—2 hours. Prerequisite: grade of C- or better in Engineering 102 and Mechanical Engineering 106. Introduction to space systems design including space project organization, requirements definition and specification, concepts formulation, system tradeoffs, subsystem design. Prototype space mission concepts are presented and a multidisciplinary mission design is

developed that considers all relevant architecture elements. Offered in alternate years. GE credit: SciEng | SE. —F. (F.) Joshi

#### **142. Orbital Mechanics (4)**

Lecture—4 hours. Prerequisite: grade of C- or better in Engineering 102. Restricted to upper division standing. Satellite orbits, multistage rockets, current global boosters, and new technologies. Design application problems include satellites, trajectory optimizations, and interplanetary trajectories. Not open for credit to student who have completed course 189B prior to Fall Quarter 2013. GE credit: SciEng | SE. —W, Su. (Su.)

#### **189C. Flight Simulation and Testing in Design of Aircraft and Spacecraft (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 102; consent of the instructor. Teaches flight test techniques together with data analysis methods to prepare students for any type of flight testing including fixed wing, rotary wing and launch vehicles. Offered irregularly. GE credit: SciEng | SE.—Sarigul-Klijn

#### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

#### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Courses in Mechanical and Aeronautical Engineering (MAE)**  
(Formerly courses in Aeronautical Science and Engineering and Mechanical Engineering.)

#### **Graduate**

#### **207. Engineering Experimentation and Uncertainty Analysis (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Mechanical Engineering 107A and 107B. Design and analysis of engineering experiments with emphasis on measurement standards, data analysis, regressions and general and detailed uncertainty analysis, including statistical treatment of experimental data intervals, propagation of bias and precision errors, correlated bias approximations, and using jitter programs. —F. (S.) C. Davis

#### **208. Measurement Methods in Fluid Mechanics and Combustion (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 165 and Engineering 103. Application of shadow, schlieren and other flow visualization methods. Introduction to optics and lasers. Measurement of velocity and concentrations in reacting and non-reacting flows with laser diagnostic techniques including LDV, Rayleigh, Raman and fluorescence scattering and CARS. Offered irregularly.

#### **210A. Advanced Fluid Mechanics and Heat Transfer (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103, 105 and Mechanical Engineering 165. Development of differential equations governing continuity, momentum and energy transfer. Solutions in laminar flow for exact cases, low and high Reynolds numbers and lubrication theory. Dynamics of inviscid flow. —F. (F.) Aldredge, Shaw

#### **210B. Advanced Fluid Mechanics and Heat Transfer (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 210A. Study of stability and transition to turbulence. Introduction to the physics of turbulence. Modeling of turbulence for numerical determination of momentum and heat transfer. —W. (W.) Hwang

#### **211. Fluid Flow and Heat Transfer (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103, 105 and Mechanical Engineering 165 or the equivalent. Design aspects of selected topics; heat conduction, fins; heat transport in ducts, boundary layers and separated flows; heat exchangers. —W. Erickson, Park, Narayanan

#### **212. Biomedical Heat and Mass Transport Processes (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Mechanical Engineering 165, Biological Systems Engineering 125, Chemical Engineering 153 or the equivalent. Application of principles of heat and mass transfer to biomedical systems related to heat exchange between the biomedical system and its environment, mass transfer across cell membranes and the design and analysis of artificial human organs. (Same course as Biomedical Engineering 212.) Offered irregularly.—Aldredge

#### **213. Advanced Turbulence Modeling (4)**

Lecture—4 hours. Prerequisite: course 210B. Methods of analyzing turbulence; kinematics and dynamics of homogeneous turbulence; Reynolds stress and heat-flux equations; second order closures and their simplification; numerical methods; application to boundary layer-type flows; two-dimensional and three-dimensional hydraulic and environmental flows. Offered irregularly.—Aldredge

#### **215. Biomedical Fluid Mechanics and Transport Phenomena (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103 or Chemical Engineering 150B or Civil and Environmental Engineering 141. Application of fluid mechanics and transport to biomedical systems. Flow in normal physiological function and pathological conditions. Topics include circulatory and respiratory flows, effect of flow on cellular processes, transport in the arterial wall and in tumors, and tissue engineering. (Same course as Biomedical Engineering 215.) Offered irregularly.

#### **216. Advanced Thermodynamics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 105. Study of topics important to energy conversion systems, propulsion and other systems using high temperature gases. Classical thermodynamics and quantum statistical mechanics of nonreacting and chemically reacting gases, gas mixtures, and other substances. Offered in alternate years. —W. Shaw

#### **217. Combustion (4)**

Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: Engineering 103 and 105, Mechanical Engineering 106. Restricted to graduate students. Review of chemical thermodynamics and chemical kinetics. Discussion of reacting flows, their governing equations and transport phenomena; detonations; laminar flame structure and turbulent combustion. Offered in alternate years. —(W.) Shaw

#### **218. Advanced Energy Systems (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103 and 105, or the equivalent. Review of options available for advanced power generation. Detailed study of basic power balances, component efficiencies, and overall powerplant performance for one advanced concept such as a fusion, magnetohydrodynamic, or solar electric powerplant. —(F.) Erickson

#### **219. Introduction to Scientific Computing in Solid and Fluid Dynamics (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 103 and 104. Scientific calculations with finite element and finite difference methods for multi-dimensional problems in solid and fluid dynamics are performed with examples in C, C++, FORTRAN, and MATLAB script files. Derivation of the basic equations of motion in finite volume form with applications to elasticity, waves. —F. (F.) Delplanque

#### **220. Mechanical Vibrations (4)**

Lecture—4 hours. Prerequisite: Engineering 122. Multiple degrees of freedom; damping measures; Rayleigh's method; vibration absorbers; eigenvalues and modeshapes; modal coordinates; forced vibrations; random processes and vibrations; auto-correlation; spectral density; first passage and fatigue failure; nonlinear systems; phase plane. Offered in alternate years.—Eke

#### **222. Advanced Dynamics (4)**

Lecture—4 hours. Prerequisite: Engineering 102. Dynamics of particles, rigid bodies and distributed systems with engineering applications; generalized

coordinates; Hamilton's principle; Lagrange's equations; Hamilton-Jacobi theory; modal dynamics orthogonality; wave dynamics; dispersion. —F. (F.) Karnopp

#### **223. Multibody Dynamics (4)**

Lecture—4 hours. Prerequisite: Engineering 102. Coupled rigid-body kinematics/dynamics; reference frames; vector differentiation; configuration and motion constraints; holonomicity; generalized speeds; partial velocities; mass; inertia tensor/theorems; angular momentum; generalized forces; comparing Newton/Euler, Lagrange's, Kane's methods; computer-aided equation derivation; orientation; Euler; Rodrigues parameters. (Same course as Biomedical Engineering 223.) —W. S. (W.) Eke, Ravani

#### **225. Spatial Kinematics and Robotics (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: C Language and course 222. Spatial kinematics, screw theory, spatial mechanisms analysis and synthesis, robot kinematics and dynamics, robot workspace, path planning, robot programming, real-time architecture and software implementation. (Same course as Biomedical Engineering 225.) Offered irregularly.—Ravani

#### **226. Acoustics and Noise Control (4)**

Lecture—4 hours. Prerequisite: Engineering 122. Description of sound using normal modes and waves; interaction between vibrating solids and sound fields; sound absorption in enclosed spaces; sound transmission through barriers; applications in design, acoustic enclosures and sound walls, room acoustics, design of quiet machinery. —Sarigul-Klijn

#### **227. Research Techniques in Biomechanics (4)**

Lecture—2 hours; laboratory—4 hours; term paper or discussion—1 hour. Prerequisite: Mathematics 22B and consent of instructor; Exercise Science 115 recommended. Experimental techniques for biomechanical analysis of human movement. Techniques evaluated include data acquisition and analysis by computer, force platform analysis, strength assessment, planar and three-dimensional videography, data reduction and smoothing, body segment parameter determination, electromyography, and biomechanical modeling. (Same course as Biomedical Engineering 227/Exercise Science 227.) Offered irregularly.

#### **228. Introduction to BioMEMS (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: BS engineering discipline or consent of instructor. Ideal for beginning graduate or advanced undergraduate students interested in microelectromechanical systems (MEMS) topics related to biological applications. Covers topics from various disciplines related to BioMEMS: mechanical, electrical, biomedical, chemical engineering, and materials science. Offered in alternate years. —F. C. Davis

#### **229. Design & Analysis of Micro-Electromechanical Systems (4)**

Lecture—4 hours. Prerequisite: consent of instructor; Engineering 45, 100, 104; Engineering 122 recommended. Mechanical design of micro-electromechanical systems (MEMS). Device modeling: lumped parameter models; energy methods; nonlinearities; electrical and mechanical noise sources. Actuation and measurement methods: capacitive, piezoresistive, thermal, piezoelectric, and optical techniques. Review of basic electronics: bridge circuits, amplitude modulation; lock-in detection. Offered in alternate years. —S. (S.) Horsley

#### **231. Musculo-Skeletal System Biomechanics (4)**

Lecture—4 hours. Prerequisite: Engineering 102. Mechanics of skeletal muscle and mechanical models of muscle, solution of the inverse dynamics problem, theoretical and experimental methods of kinematic and kinetic analysis, computation of intersegmental load and muscle forces, applications to gait analysis and sports biomechanics. (Same course as Biomedical Engineering 231.) Offered irregularly.

**232. Skeletal Tissue Mechanics (3)**

Lecture—3 hours; laboratory—1 hour. Prerequisite: Engineering 104B. Overview of the mechanical properties of the various tissues in the musculoskeletal system, the relationship of these properties to anatomic and histologic structure, and the changes in these properties caused by aging and disease. The tissues covered include bone, cartilage and synovial fluid, ligament and tendon. (Same course as Biomedical Engineering 232.)—S. (S.) R. Fyhrie

**234. Design and Dynamics of Road Vehicles (4)**

Lecture—4 hours. Prerequisite: Mechanical Engineering 134. Analysis and numerical simulation of road vehicles with on design applications.—W. (W.) Velinsky

**236. Aerodynamics in Nature and Technology (4)**

Lecture—4 hours. Prerequisite: Engineering 103. Introduction to aerodynamics in nature, fundamentals of turbulence in atmospheric flows, planetary boundary layers, pedestrian-level winds in urban areas. Criteria for laboratory modeling of atmospheric flows, wind-tunnel testing. Offered irregularly.

**237. Analysis and Design of Composite Structures (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 104 or equivalent. Modeling and analysis methodology for composite structures including response and failure. Laminated plate bending theory. Introduction to failure processes. Includes discussion of aerospace structural analysis.—S. (F.) La Saponara

**238. Advanced Aerodynamic Design and Optimization (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Application of aerodynamic theory to obtain optimum aerodynamic shapes. Both analytic solutions and solutions obtained with numerical optimization techniques will be examined. Includes introduction to the calculus of variations and numerical optimization techniques. Offered irregularly.—van Dam

**239. Advanced Finite Elements and Optimization (4)**

Lecture—4 hours. Prerequisite: Engineering 180 or Applied Science 115 or Mathematics 128C. Introduction to advanced finite elements and design optimization methods, with application to modeling of complex mechanical, aerospace and biomedical systems. Application of states of the art in finite elements in optimum design of components under realistic loading conditions and constraints. (Same course as Biomedical Engineering 239.) Offered in alternate years.—W. Sarigul-Klijn

**240. Computational Methods in Nonlinear Mechanics (4)**

Lecture—4 hours. Prerequisite: Applied Science Engineering 115 or Mathematics 128B or Engineering 180. Deformation of solids and the motion of fluids treated with state-of-the-art computational methods. Numerical treatment of nonlinear dynamics; classification of coupled problems; applications of finite element methods to mechanical, aeronautical, and biological systems. (Same course as Biomedical Engineering 240.) Offered irregularly.—Sarigul-Klijn

**242. Stability of Thin-Walled Structures (4)**

Lecture—4 hours. Prerequisite: Engineering 104 or equivalent. Static stability of thin-walled aerospace structures treated from both theoretical and practical design perspectives. Both monolithic and composite construction considered. Buckling of stiffened panels, shells, and thin-walled beams, experimental methods and failure/crippling processes. Offered irregularly.—La Saponara

**248. Advanced Turbomachinery (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103 and 105. Preliminary aerodynamic design of axial and radial flow compressors and turbines. Design of diffusers. Selection of turbomachine and configurations and approximations

to optimum dimensions and flow angles. Introduction to through flow analysis. Rotating stall and surge, and aeromechanical considerations. Offered in alternate years.—S. (S.) R. Davis

**250A. Advanced Methods in Mechanical Design (4)**

Lecture—4 hours. Prerequisite: Mechanical Engineering 150A and 150B or the equivalents, or consent of instructor. Applications of advanced techniques of solid mechanics to mechanical design problems. Coverage of advanced topics in stress analysis and static failure theories with emphasis in design of machine elements. Design projects emphasizing advanced analysis tools for life cycle evaluation.—F. (F.) Ravani, Velinsky

**250B. Advanced Methods in Mechanical Design (4)**

Lecture—4 hours. Prerequisite: course 250A. Applications of advanced techniques of solid mechanics to mechanical design problems. Advanced topics in variational methods of mechanics with emphasis in design of machine elements. Design projects emphasizing advanced analysis tools.—W. Hill

**250C. Mechanical Performance of Materials (4)**

Lecture—4 hours. Prerequisite: undergraduate course in stress analysis and mechanical behavior of materials. Occurrence, mechanisms, and prediction of fatigue and fracture phenomenon. Use of stress and strain to predict crack initiation. Use of fracture mechanics to predict failure and crack propagation. Effects of stress concentration, manufacturing, load sequence, irregular loading, and multi-axial loading.—Hill

**251. Mechatronics System Design (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Mechanical Engineering 154 and 172 or Electrical and Computer Engineering 157A, 157B. Motion mechanism design, electric actuator, power electronics motion control, sensor technologies, personal computer-based control systems design, motion control general operating system and real time operating systems, motion control software design, discrete event control software design. Offered in alternate years.—W. (W.) Yamazaki

**252. Information Processing for Autonomous Robotics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 6, Mechanical Engineering 5, or equivalent programming experience, Mechanical Engineering 154, 171, or consent of instructor. Computational principles for sensing, reasoning, and navigation for autonomous robots. Offered in alternate years.—W. (W.) Joshi

**253. Network Theory and Applications (4)**

Lecture/discussion—4 hours. Prerequisite: Mathematics 22A; Mathematics 22B; Statistics 13 or 120; experience with computer software; or consent of instructor. Develops the mathematical theory underlying growth, structure and function of networks with applications to physical, social, biological and engineered systems. Topics include network growth, resilience, epidemiology, phase transitions, software and algorithms, routing and search control, cascading failures. (Same course as Computer Science Engineering 253.) Offered in alternate years.—F. D'Souza

**254. Engineering Software Design (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mechanical Engineering 5, Engineering 180. Principle and design of engineering software. Advanced topics in engineering software design, applications of object-oriented programming, very high-level languages, real-time multi-thread computing and sensor fusion, Web-based network computing, graphics, and GUI in engineering. Offered in alternate years.—F. Cheng

**255. Computer-Aided Design and Manufacturing (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: proficiency in a high level programming language such as Fortran, Pascal, or C. Representation and processing of geometrical information in design and

manufacturing. Numeric and symbolic computations. Coordinate systems and transformations. Bezier and B-spline curves and surfaces. Interpolation and approximation methods. Intersections, offsets, and blends. Path planning for machining, inspection, and robotics applications. Offered in alternate years.—S. Farouki

**258. Hybrid Electric Vehicle System Theory and Design (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mechanical Engineering 150B, graduate standing in Mechanical and Aeronautical Engineering. Advanced vehicle design for fuel economy, performance, and low emissions, considering regulations, societal demands and manufacturability. Analysis and verification of computer design and control of vehicle systems in real vehicle tests. Advanced engine concepts. Offered irregularly.

**261. Gas Dynamics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103 or the equivalent. Flow of compressible fluids. Isentropic flow. Flow with friction, heat transfer, chemically reacting gas and particle mixtures. Normal and oblique shock waves, combustion, blast and expansion waves. Method of characteristics. Offered irregularly.

**262. Advanced Aerodynamics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Aeronautical Engineering 126. Study of inviscid and viscous flows about aerodynamic shapes at subsonic, transonic and supersonic conditions. Application of aerodynamic theory to design for reduced drag and increased lift. Offered irregularly.—Hafez

**263. Introduction to Computational Aerodynamics and Fluid Dynamics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103 or consent of instructor. Introduction to numerical methods for solution of fluid flow problems. Discretization techniques and solution algorithms. Finite difference solutions to classical model equations pertinent to wave phenomena, diffusion phenomena, or equilibrium. Application to the incompressible Navier-Stokes equation. Offered irregularly.

**264. Computational Aerodynamics (4)**

Lecture—4 hours. Prerequisite: Aeronautical Science and Engineering 126, Engineering 180, or consent of instructor. Numerical methods for aerodynamics flow simulation in the transonic regime. Solutions of steady and unsteady potential and compressible boundary layer equations. Numerical schemes for mixed type equations and shock waves/numerical grid generation. Viscous/inviscid interaction and coupling procedures. Offered irregularly.—Hafez

**266. Advanced Wind-Tunnel Testing (4)**

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: undergraduate course in fluid dynamics. Aspects of low-speed wind-tunnel testing for solving aeronautical and non-aeronautical problems including tunnel corrections, scale effects, force and moment measurements, and flow visualization. Offered irregularly.—van Dam

**267. Parallel Computations in Fluid/Thermal Sciences (4)**

Lecture—2 hours; discussion—2 hours. Prerequisite: Mechanical Engineering 106, 165, Engineering 180 or equivalent; or consent of instructor. Programming languages and constructs for engineering analysis on parallel computers including MPI (distributed), OpenMP (shared), and Fortran95. Graduate or junior/senior undergraduate as a technical elective. Offered in alternate years.—F. (F.) van Davis

**268. Wind Power Engineering (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 102 and 103, or equivalent, or consent of instructor. Fundamentals for understanding the conversion of wind power to mechanical power and electricity. Related engineering, economic and societal issues. Offered in alternate years.—F. (F.) van Dam

**269. Fuel Cell Systems (4)**

Lecture—2 hours; discussion—2 hours. Prerequisite: Mechanical Engineering 106, 107, 165, or equivalent, or consent of instructor; graduate or junior/senior undergraduate as a technical elective. Limited enrollment. Basics of electrochemistry and fuel cell engines in mobile and stationary applications. Aspects of fuel cell energy converters and their subsystems including practice with existing fuel cell and hydrogen systems on campus. Offered in alternate years.—S. Erickson

**271. Advanced Modeling and Simulation of Mechatronic Systems (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mechanical Engineering 172 or the equivalent. Multiport models of mechanical, electrical, hydraulic, and thermal devices; bond graphs, block diagrams and state space equations; modeling of multiple energy domain systems; three-dimensional mechanics; digital simulation laboratory.—F. (F.)

**272. Theory and Design of Control Systems (4)**

Lecture—4 hours. Prerequisite: Mechanical Engineering 172 or the equivalent. Mathematical representations of linear dynamical systems. Feedback principles; benefits and cost of feedback. Analysis and design of control systems based on classical and modern approaches, with emphasis on applications to mechanical and aeronautical systems.—Assadian

**274. Analysis and Design of Digital Control Systems (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Mechanical Engineering 172. Discrete systems analysis; digital filtering; sample data systems; state space and transform design techniques; quantization effects; multi-input, multi-output systems. Offered in alternate years.—(S.) Hess

**275. Advance Aircraft Stability and Control (4)**

Lecture—3 hours; discussion—1 hour. Development and analysis of aircraft equations of motion. Flexible modes. Response to control actuation. Random inputs and disturbances. Stability and control augmentation system design. Handling qualities. Offered in alternate years.—S. Hess, Kong

**276. Data Acquisition and Analysis (4)**

Lecture—3 hours; discussion—1 hour. Application of computers for data acquisition and control. Topics include computer architecture, characteristics of transducers, hardware for laboratory applications of computers, fundamentals of interfaces between computers and experimental equipment, programming techniques for data acquisition and control, basic data analysis. Offered in alternate years.

**290C. Graduate Research Conference (1)**

Discussion—1 hour. Prerequisite: consent of instructor. Individual and/or group conference on problems, progress, and techniques in mechanical and aeronautical engineering research. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**297. Seminar (1)**

Discussion—1 hour. Prerequisite: consent of instructor. Current topics in engineering including developments in mechanical and aeronautical engineering with presentations by students, faculty, and visitors. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**298. Group Study (1-5)****299. Research (1-12)**

Prerequisite: consent of instructor. (S/U grading only.)

**Professional****390. The Teaching of Aeronautical Science and Engineering (1)**

Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in Aeronautical Science and Engineering. Methods of leading discussion groups or laboratory sections, writing

and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

# English

(College of Letters and Science)

Elizabeth Miller, Ph.D., Chairperson of the Department

**Department Office.** 176 Voorhies Hall  
530-752-2257; <http://english.ucdavis.edu>

**Faculty**

Gina Bloom, Ph.D., Associate Professor  
Stephanie Boluk, Ph.D., Assistant Professor  
Seeta Chaganti, Ph.D., Associate Professor  
Academic Senate Distinguished Teaching Award  
Joshua Clover, M.F.A., Professor  
Lucy Corin, M.F.A., Professor  
Gregory Dobbins, Ph.D., Associate Professor  
Frances E. Dolan, Ph.D., Professor  
Academic Senate Distinguished Teaching Award  
Margaret W. Ferguson, Ph.D., Professor  
Academic Senate Distinguished Teaching Award  
Kathleen Frederickson, Ph.D., Associate Professor  
Elizabeth S. Freeman, Ph.D., Professor  
Academic Senate Distinguished Teaching Award  
Danielle Heard, Ph.D., Assistant Professor  
W. Jack Hicks, Ph.D., Senior Lecturer  
Pam Houston, B.A., Professor  
Hsuan Hsu, Ph.D., Professor  
Mark Jerng, Ph.D., Associate Professor  
Alessa Johns, Ph.D., Professor  
Richard A. Levin, Ph.D., Professor  
Academic Senate Distinguished Teaching Award  
Yiyun Li, M.F.A., Professor  
Desirée Martínez, Ph.D., Associate Professor  
John Marx, Ph.D., Professor  
Tobias Menely, Ph.D., Assistant Professor  
Colin Milburn, Ph.D., Professor  
Elizabeth Miller, Ph.D., Professor  
Katie Peterson, Ph.D., Assistant Professor  
Margaret Ronda, Ph.D., Assistant Professor  
Paramita Roy, Ph.D., Professor  
Scott C. Shershaw, Ph.D., Professor  
Scott Simonson, Ph.D., Professor  
David Simpson, Ph.D., Professor  
Matthew Stratton, Ph.D., Associate Professor  
Matthew Vernon, Ph.D., Assistant Professor  
Claire Waters, Ph.D., Professor  
Evan Watkins, Ph.D., Professor  
Joe Wenderoth, M.F.A., Professor  
Michael Ziser, Ph.D., Associate Professor

**Emeriti Faculty**

Don P. Abbott, Ph.D., Professor Emeritus  
Max Byrd, Ph.D., Professor Emeritus  
Peter Dale, Ph.D., Professor Emeritus  
Joanne F. Diehl, Ph.D., Professor Emerita  
Lynn R. Freed, Ph.D., Professor Emerita  
Sandra M. Gilbert, Ph.D., Professor Emerita  
Thomas A. Hanzo, Ph.D., Professor Emeritus  
John O. Hayden, Ph.D., Professor Emeritus  
Peter L. Hays, Ph.D., Professor Emeritus  
Michael J. Hoffman, Ph.D., Professor Emeritus  
Robert H. Hopkins, Ph.D., Professor Emeritus  
Clarence Major, Ph.D., Professor Emeritus  
Sandra J. McPherson, B.A., Professor Emerita  
Linda A. Morris, Ph.D., Professor Emerita  
James J. Murphy, Ph.D., Professor Emeritus  
Marijane Osborn, Ph.D., Professor Emerita  
David A. Robertson, Ph.D., Professor Emeritus  
Academic Senate Distinguished Teaching Award  
Winfried Schleiner, Ph.D., Professor Emeritus  
Gwendolyn Schwabe, M.S., Senior Lecturer Emerita  
Gary Snyder, B.A., Professor Emeritus  
Raymond B. Waddington, Ph.D., Professor Emeritus  
Alan B. Williamson, Ph.D., Professor Emeritus  
Karl F. Bender, Ph.D., Professor Emeritus

**The Major Program**

The study of English develops skills in reading analytically and perceptively and in writing clearly and effectively.

**The Program.** The English department offers three kinds of courses: composition courses, undergraduate courses, and graduate courses. Composition courses develop skills in reading analytically and in writing persuasively. Undergraduate and graduate courses cover the entire range of English and American literature, as well as creative writing. Students majoring in English may elect a creative writing emphasis or a literature, criticism, and theory emphasis. All majors take courses introducing them to the literatures of various periods and places, to critical theory, and to frontiers of literary expression, such as the relationship of literature to environmentalism or the emergence of new media. The creative writing emphasis focuses on fiction, poetry, and article writing. The literature, criticism, and theory emphasis focuses on advanced critical analysis and research. All majors have the opportunity to work with distinguished writers, critics, scholars, and teachers.

**Career Alternatives.** Graduates have found the major excellent pre-professional training for careers in teaching, writing, law, medicine, library work, journalism, and more. Many graduates are employed in publishing, marketing, advertising, or the tech sector. Others have worked in local, state, and federal government agencies, as well as in industry. Many have gone on to graduate study in a wide range of fields including English, education, counseling, and more.

**A.B. Major Requirements:**

	UNITS
<b>Preparatory Subject Matter .....</b>	<b>20</b>
English 3 or University Writing	
Program 1 .....	4
One course from: English 40, 43, 44,	
45 .....	4
English 10A, 10B, 10C .....	12
<b>Depth Subject Matter.....</b>	<b>44</b>
English 110A or 110B .....	4
Historical Distribution Requirements .....	20
Three courses focusing on literature written in English before 1800, at least one of which must be on literature written primarily before 1500:	
Before 1500	
English 111, 113A, 113B	
1500-1800	
English 115, 117, 122, 123, 142,	
150A, 155A, 185A	
One course focusing on literature written in English between 1800 and 1900:	
English 130, 133, 143, 144, 155B,	
158A, 181A, 185B	
One course focusing on literature written in English between 1900 and present:	
English 137N, 138, 146N, 147, 150B,	
155C, 156, 158B, 166, 167, 168,	
181B, 185C	
Non-Historical Distribution Requirements ...	8
One course on literature and ethnicity, literature and gender, or literature and sexuality:	
English 125, 139, 140, 141, 166, 167,	
178, 179, 181A, 181B, 185A, 185B,	
185C, 186	
One course in film and media studies, language studies, cultural studies and contexts, literature and science/technology, or literature and the environment:	
English 105, 106, 107, 120, 160,	
161A, 161B, 162, 164/Science and	
Technology Studies 164, 171A, 171B,	
172, 173, 175, 180, 182, 183, 184;	
Linguistics 106; Science and Technology	
Studies 173	
Please note that while some courses are identified as fulfilling more than one	

**Fall 2011 and on Revised General Education (GE): AH=Arts and Humanities; SE=Science and Engineering; SS=Social Sciences;**

**ACGH=American Cultures; DD=Domestic Diversity; OL=Oral Skills; QL=Quantitative; SL=Scientific; VL=Visual; WC=World Cultures; WE=Writing Experience**

**Pre-Fall 2011 General Education (GE): ArtHum=Arts and Humanities; SciEng=Science and Engineering; SocSci=Social Sciences; Div=Domestic Diversity; Wrt=Writing Experience**

**Quarter Offered:** F=Fall, W=Winter, S=Spring, Su=Summer; 2017-2018 offering in parentheses

distribution requirement, a given course can only fulfill one such requirement.

#### **Area of Emphasis (choose one)..... 12**

*Literature, Criticism, and Theory*

One upper division English elective.

Two advanced courses, one of which can be a seminar:

Please note that English 110A or 110B is a prerequisite for advanced study in the major.

English 149, 153, 159, 163, 165, 177, 187A, 188A, 189, 194H, 195H

*Creative Writing*

Three sections of English 100F, 100P, 100NF, 100FA, 100PA

#### **Total Units for the Major ..... 64**

**English Majors.** Up to four upper division units in a national literature other than English or American, or in Comparative Literature, may count toward the requirements of the major.

**Major Advisers.** G. Bloom, S. Boluk, S. Chaganti, J. Clover, L. Corin, G. Dobbins, F. Dolan, M. Ferguson, K. Fredericksen, E. Freeman, D. Heard, W.J. Hicks, P. Houston, H. Hsu, M. Jerng, A. Johns, R.A. Levin, Y. Li, D. Martín, J. Marx, T. Menely, C. Milburn, E. Miller, K. Peterson, M. Ronda, P. Roy, S. Shershaw, S. Simon, D. Simpson, M. Stratton, M. Vernon, C. Waters, E. Watkins, J. Wenderoth, M. Ziser

**Major Advising.** All new and prospective English majors are encouraged to see the undergraduate staff adviser, individually, once per year, at minimum.

**Foreign Languages.** Students who contemplate advanced study in English should prepare for foreign language requirements for higher degrees and should consult with the graduate adviser.

**Undergraduate Adviser.** See Department website at <http://english.ucdavis.edu> or the Departmental Advising Office in 177 Voorhies Hall.

#### **Minor Program Requirements:**

UNITS

#### **English ..... 20**

Five upper division courses, at least four of which will be literature courses ..... 20

**Honors and Honors Program.** A Senior Honors Program is available to an invited group of English majors, who prepare and write a Senior Thesis (either a research paper or creative writing) in their final year. The critical honors program consists of four units of 194H and four units of 195H, normally taken during Winter and Spring quarters of the senior year. The creative writing honors program consists of four units of 100FA or 100PA, normally taken during Spring quarter of the junior year, and four units of 195H, normally taken Winter quarter of the senior year. Completion of the program is a prerequisite for High or Highest Honors at graduation. Eligibility criteria and application materials may be obtained at the Undergraduate Advising office in 177 Voorhies Hall or by accessing the Department website at <http://english.ucdavis.edu>. For more details, see *Graduation Honors*, on page 95.

**Education Abroad Options.** The department strongly encourages interested students to pursue their studies abroad. It is possible for students to complete significant portions of the English major provided that the course is evaluated as at least four UC Davis units; the course is considered upper division by the standards set forth by UC Davis Study Abroad; the student presents copies of the coursework, syllabus, and writing assignments to the department's advising staff.

**Teaching Credential Subject Representative.** See the Teacher Education program.

**Graduate Study.** The Department of English offers programs of study and research leading to the M.A. in literature and creative writing and the Ph.D. in literature. Detailed information may be obtained from the graduate adviser or the Chairperson of the Department.

The department's affiliation with the Critical Theory Program also provides the opportunity for students in English to prepare for the designated emphasis in Critical Theory (an interdisciplinary program in theories and methodologies in the humanities and social sciences).

**Graduate Director.** Mark Jerng, Ph.D.

**Entry Level Writing.** Students must have met the Entry Level Writing requirement before taking any course in English. C. Bates, Director.

**Prerequisites.** English 3 or University Writing Program 1 is required for admission into all preparatory courses (40, 43, 44, 45, 10A, 10B, 10C), and all upper division courses, unless otherwise stated in the course listings. Comparative Literature 1, 2, 3, or 4 or Native American Studies 5 may normally be substituted for English 3 or University Writing Program 1.

#### **Courses in English (ENL)**

#### **Lower Division**

##### **3. Introduction to Literature (4)**

Lecture/discussion—4 hours. Prerequisite: completion of Entry Level Writing requirement. Introductory study of several genres of English literature, emphasizing both analysis of particular works and the range of forms and styles in English prose and poetry. Frequent writing assignments will be made. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.)

##### **4. Critical Inquiry and Literature: Freshman Seminar (4)**

Seminar—4 hours. Prerequisite: completion of Subject A requirement and consent of instructor; enrollment limited to freshmen. Critical inquiry into significant literary texts. Emphasis on close reading, classroom dialogue, and the writing of several papers or a longer seminar paper. GE credit: ArtHum, Wrt | AH, WE.—S. (S.)

##### **5. Introduction to Creative Writing: Fiction (4)**

Lecture/discussion—4 hours. Prerequisite: completion of Entry Level Writing requirement. Elementary principles of writing fiction. Write both in prescribed forms and in experimental forms of their own choosing. No final examination. May be repeated one time for credit. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.)

##### **5P. Introduction to Creative Writing: Poetry (4)**

Lecture/discussion—4 hours. Prerequisite: completion of Entry Level Writing requirement. Elementary principles of writing poetry. Write both in prescribed forms and in experimental forms of their own choosing. No final examination. May be repeated one time for credit. GE credit: ArtHum | AH.—F, W, S. (F, W, S.)

##### **5NF. Introduction to Creative Writing: Non-Fiction (4)**

Lecture/discussion—4 hours. Prerequisite: completion of Entry Level Writing requirement. Elementary principles of writing creative non-fiction. Work in prescribed literary forms (such as essay, meditation, biography, memoir, book review, documentary, or experimental non-fiction forms) and forms of students' choosing. No final examination. May be repeated one time for credit when instructor differs. GE credit: ArtHum, Wrt | AH, WE.

##### **10A. Literatures in English I: To 1700 (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or equivalent. Historical introduction to English language and literature from 800-1700. Linguistic borrowing, innovation, and change. Emergence of key literary genres. Colonial America as a new site of English literary production and consumption. GE credit: ArtHum | AH, WE.—F, W, S. (F, W, S.)

##### **10B. Literatures in English II: 1700-1900 (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or equivalent. Historical introduction to

English language and literature from 1700-1900. Linguistic borrowing, innovation, colonization, and change. Emergence and development of key literary genres. America, Britain, Ireland, Scotland, and India as important sites of English literary production and consumption. GE credit: ArtHum | AH, WE.—F, W, S. (F, W, S.)

##### **10C. Literatures in English III: 1900 to Present (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or equivalent. Historical introduction to English language and literature from 1900-present. Linguistic borrowing, innovation, and change. Emergence and development of key literary genres. Formal experimentation. Modernism as transnational phenomenon. GE credit: ArtHum | AH, WE.—F, W, S. (F, W, S.)

##### **40. Introductory Topics in Literature (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 3 or University Writing Program 1 or equivalent. Study of a special topic. Literature written in English in any period or place or genre. Thematic, formal, or temporal focus. May be repeated two times for credit if content differs. GE credit: ArtHum, Wrt | AH, WE.

##### **41. Introductory Topics in Literature and Media (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 3 or University Writing Program 1 or equivalent. Study of a topic centered on the relationships between literature and moving-image media. May be repeated two times for credit when topic differs. GE credit: ArtHum | AH, VL, WE.—S. (S.)

##### **42. Approaches to Reading (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Close reading and interpretation of literature from a variety of traditional and contemporary approaches. Topics include textual and historical approaches; new criticism; formalism; psychological criticism; feminism and gender; reader-response; materialist approaches. Frequent written assignments. GE credit: ArtHum, Wrt | AH, WE.

##### **43. Introductory Topics in Drama (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 3 or University Writing Program 1 or its equivalent. Close reading of, and topics relating to selected works of British and American drama from a range of historical periods. May be repeated two times for credit when content differs. GE credit: ArtHum, Wrt | AH, WE.

##### **44. Introductory Topics in Fiction (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 3 or University Writing Program 1 or its equivalent. Close reading of, and topics relating to British and American Fiction: short stories, novellas, novels. Frequent written exercises. May be repeated two times for credit when content differs. GE credit: ArtHum, Wrt | AH, WE.

##### **45. Introductory Topics in Poetry (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 3 or University Writing Program 1 or its equivalent. Topical study and close reading of selections from English and American poetry. May be repeated two times for credit when content differs. GE credit: ArtHum, Wrt | AH, WE.

##### **46. Internship in English (1-12)**

Internship—3-36 hours. Prerequisite: course 3 or University Writing Program 1. Internships in fields where students can practice their skills. May be repeated for credit for a total of 12 units. (P/NP grading only.)—F, W, S. (F, W, S.)

##### **48. Directed Group Study (1-5)**

Prerequisite: course 3 or University Writing Program 1. (P/NP grading only.)—F, W, S. (F, W, S.)

##### **98F. Student Facilitated Course (1-4)**

Prerequisite: course 3 or University Writing Program 1; consent of instructor. Student facilitated course intended primarily for lower division students. (P/NP grading only.) Offered irregularly.

**99. Special Study for Undergraduates (1-5)**  
(P/NP grading only.)—F, W, S. (F, W, S.)

### Upper Division

**100F. Creative Writing: Fiction (4)**

Discussion—4 hours; development and evaluation of written materials, and conferences with individual students. Prerequisite: course 5F or 5P, or consent of instructor; priority given to English (Creative Writing) majors. Writing of fiction. May be repeated for credit with consent of instructor. No final examination.—F, W, S. (F, W, S.)

**100FA. Creative Writing Advanced Fiction (4)**

Discussion—4 hours. Prerequisite: course 100F. Priority given to English majors; admission by application only. Development and evaluation of students' work in prose, primarily in the workshop format. Some reading and discussion of published novels and short stories. Conferences with individual students once per quarter. May be repeated one time for credit with consent of instructor. —S. (S.)

**100NF. Creative Writing: Non-Fiction (4)**

Discussion—4 hours; development and evaluation of written materials, and conferences with individual students. Prerequisite: course 3 or University Writing Program 1, or consent of instructor; priority given to English (Creative Writing) majors. Writing of non-fiction. May be repeated for credit with consent of instructor. No final examination.

**100P. Creative Writing: Poetry (4)**

Discussion—4 hours. Prerequisite: course 5F or 5P, or consent of instructor; priority given to English (Creative Writing) majors. Writing of poetry. May be repeated for credit with consent of instructor. No final examination.

**100PA. Creative Writing Advanced Poetry (4)**

Discussion—4 hours. Prerequisite: course 100P. Priority to English majors; admission by application only. Development and evaluation of students' work in poetry, primarily in the workshop format. Some reading and discussion of published works of poetry. Conferences with individual students once per quarter. May be repeated one time for credit with consent of instructor. —S. (S.)

**105. History of the English Language (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 or the equivalent. History of the English language. Examination of the language as recorded from Old English to present-day English. Relationship of English to other languages; development of vocabulary, phonology, and grammatical patterns. GE credit: ArtHum, Wrt | AH, WE.

**106. English Grammar (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or Linguistics 1 or University Writing Program 1 or consent of instructor. Survey of present-day English grammar as informed by contemporary linguistic theories. The major syntactic structures of English; their variation across dialects, styles, and registers; their development; and their usefulness in describing the conventions of English. (Same course as Linguistics 106 and University Writing Program 106.) GE credit: ArtHum | AH.

**106P. English Grammar Practicum (2)**

Discussion—2 hours. Prerequisite: course 106/Linguistics 106 (may be taken concurrently). Practice in teaching the principles of grammar to the kinds of audiences teachers encounter in California. Discussions with teachers who teach in these areas. Examination of pedagogical research on teaching grammar. (P/NP grading only.)

**107. Freedom of Expression (4)**

Lecture—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historical development of fundamental issues and contemporary controversies about freedom of expression, with emphasis on literary and artistic censorship. GE credit: ArtHum, Wrt | AH, WE.

**110A. Introduction to Literary Theory (4)**

Lecture/discussion—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1. Key theoretical terms, concepts, and thinkers from the Greeks to the modern era. GE credit: ArtHum, Wrt | AH, WE.

**110B. Introduction to Modern Literary and Critical Theory (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1. History of literary criticism in the modern era, with emphasis on the ties with the past and the special problems presented by modern literary theory. GE credit: ArtHum, Wrt | AH, WE.

**111. Topics in Medieval Literature (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically focused intensive examination of selected topics in Medieval British literature. GE credit: ArtHum, Wrt | AH, WE.

**113A. Chaucer: Troilus and the "Minor" Poems (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Development of the poet's artistry and ideas from his first work to his masterpiece, "Troilus and Criseyde." GE credit: ArtHum, Wrt | AH, WE.

**113B. Chaucer: The Canterbury Tales (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Literary analysis of the complete "Canterbury Tales." Courtly love, literary forms, medieval science and astrology, theology and dogma as they inform the reading of Chaucer's work. GE credit: ArtHum, Wrt | AH, WE.

**115. Topics in Sixteenth and Seventeenth Century Literature (4)**

Lecture/discussion—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1. Historically or thematically focused study of works of the Renaissance. GE credit: ArtHum, Wrt | AH, WE.

**117. Shakespeare (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or equivalent. Historically, generically, or thematically focused study of Shakespeare's works. May be repeated two times for credit. GE credit: ArtHum, Wrt | AH, WE.—F, W, S.

**120. Law and Literature (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1, or equivalent. Historically, thematically, or generically focused study of the relationship between law and literature. GE credit: ArtHum, Wrt | ACGH, AH, DD, OL, WE.

**122. Milton (4)**

Lecture/discussion—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1. Selected major works, including Paradise Lost. GE credit: ArtHum, Wrt | AH, WE.

**123. 18th-Century British Literature (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1. Historically or thematically focused study of 18th century English literature. GE credit: ArtHum, Wrt | AH, WE.

**125. Topics in Irish Literature (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or equivalent. Intensive study or treatment of special topics relating to the emergence, invention, and re-invention of Irish literature. May be repeated two times for credit when content differs. GE credit: ArtHum, Div, Wrt | AH, WE.

**130. British Romantic Literature (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically focused study of works of Romantic English literature. GE credit: ArtHum, Wrt | AH, WC, WE.

**133. 19th-Century British Literature (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically focused study of works of 19th-century English literature. GE credit: ArtHum, Wrt | AH, WC, WE.

**137. British Literature, 1900-1945 (4)**

Lecture—3 hours; extensive writing. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically focused study of works of British literature (drama, poetry, prose fiction) from the period between 1900 and the end of World War II. GE credit: ArtHum, Wrt | AH, WE.

**138. British Literature: 1945 to Present (4)**

Lecture—3 hours; extensive writing. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically focused study of works of British literature (drama, poetry, prose fiction) from the period between 1945 and the present. GE credit: ArtHum, Wrt | AH, WE.

**139. Topics in Global Literatures and Cultures (4)**

Lecture—3 hours; extensive writing or discussion. Prerequisite: course 3 or University Writing Program 1 or equivalent. Historically or thematically organized study of Anglophone literature at the global scale. Possible emphases: globalization of English and its literatures; the history of "world literature"; literatures of British imperialism; questions of translation. May be repeated two times for credit when content differs. GE credit: ArtHum, Div, Wrt | AH, WE.

**140. Topics in Postcolonial Literatures and Cultures (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Study of postcolonial literature of Anglophone colonies. Specific emphases may include literature from and about Anglophone India, the Caribbean, the Middle East, South Asia, Africa, and/or South America. GE credit: ArtHum, Div, Wrt | AH, WE.

**141. Topics in Diasporic Literatures and Migration (4)**

Lecture/discussion—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Study of literatures, histories, and cultures of one or more diasporic groups. GE credit: ArtHum, Div, Wrt | AH, WE.—F.

**142. Early American Literature (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically focused study of American literature of the 17th and 18th centuries. GE credit: ArtHum, Wrt | ACGH, AH, WE.

**143. 19th-Century American Literature to the Civil War (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically focused study of works of 19th-century American literature. GE credit: ArtHum, Wrt | ACGH, AH, DD, WE.

**144. Post-Civil War American Literature (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically focused study of works of post-Civil War American literature. GE credit: ArtHum, Wrt | ACGH, AH, WE.

**146. American Literature 1900-1945 (4)**

Lecture—3 hours; extensive writing. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically focused study of American literature (drama, poetry, prose fiction) from the period between 1900 and the end of World War II. GE credit: ArtHum, Div, Wrt | AH, WE.

from the period between 1900 and the end of World War II. GE credit: ArtHum, Wrt | ACGH, AH, DD, WE.

#### **147. American Literature, 1945 to the Present (4)**

Lecture—3 hours; extensive writing. Prerequisite: course 3 or University Writing Program 1 or equivalent. Historically or thematically focused study of American literature (drama, poetry, prose fiction) from the period between 1945 and the present. GE credit: ArtHum, Wrt | ACGH, AH, DD, WE.

#### **149. Topics in Literature (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. Intensive examination of literature considered in topical terms, not necessarily historically. May be repeated for credit when content differs. GE credit: ArtHum, Wrt | AH, WE.

#### **150A. British Drama to 1800 (4)**

Lecture/discussion—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically focused study of works of English drama prior to 1800. GE credit: ArtHum, Wrt | AH, WC, WE.

#### **150B. Drama from 1800 to the Present (4)**

Lecture/discussion—3 hours; extensive writing or discussion. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically focused study of works of British drama from 1800 to the present. GE credit: ArtHum, Wrt | AH, WC, WE.

#### **153. Topics in Drama (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. Historical or thematic study of drama. May be repeated for credit when topic differs. GE credit: ArtHum, Wrt | AH, WE.

#### **155A. 18th-Century British Novel (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically organized examination of the 18th-century British novel, with particular emphasis on its evolution, including the epistolary novel, the picaresque novel, and the Gothic novel: Richardson, Fielding, Sterne, Austen. GE credit: ArtHum, Wrt | AH, WC, WE.

#### **155B. 19th-Century British Novel (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically organized examination of 19th-century British novelists, with emphasis on the historical novel, the social novel, and novels by women: Scott, Dickens, the Brontës, Eliot, Hardy. GE credit: ArtHum, Wrt | AH, WC, WE.

#### **155C. 20th-Century British Novel (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically organized examination of the 20th-century British novel, with emphasis on impressionism; the revolt against naturalism; the experimental novel; the anti-modernist reaction: Conrad, Joyce, Woolf, Lawrence, Drabble, Rhys. GE credit: ArtHum, Wrt | AH, WC, WE.

#### **156. The Short Story (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. The short story as a genre; its historical development, techniques, and formal character as a literary form. European as well as American writers. GE credit: ArtHum, Wrt | AH, WE.

#### **158A. The American Novel to 1900 (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically organized examination of the rise and development of the American novel from its beginnings; Hawthorne, Melville, Twain, James, and others. GE credit: ArtHum, Wrt | ACGH, AH, WE.

#### **158B. The American Novel from 1900 to the Present (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically organized examination of important American novelists from 1900 to the present: authors may include Willa Cather, Nathanael West, William Faulkner, Ralph Ellison, Zora Neale Hurston, Thomas Pynchon, Ishmael Reed, Maria Helena Viramontes, Rachel Kushner, and others. GE credit: ArtHum, Wrt | AH, DD, WE.

#### **159. Topics in the Novel (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. Examination of major novels arranged thematically. Topics might include Bildungsroman, stream-of-consciousness novel, Gothic novel, historical novel. May be repeated for credit when topic differs. GE credit: ArtHum, Wrt | AH, WE.

#### **160. Film as Narrative (4)**

Lecture—3 hours; film viewing—3 hours. Prerequisite: course 3 or University Writing Program 1. Study of modern film (1930 to present) as a storytelling medium. Offered in alternate years. GE credit: ArtHum, Wrt | AH, VL, WE.

#### **161A. Film History I: Origins to 1945 (4)**

Lecture—3 hours; film viewing—3 hours. Prerequisite: course 3 or University Writing Program 1. Cultural and aesthetic history of filmmaking from its origins in the 1890's through 1945. (Courses 161A and 161B need not be taken in sequence.) Offered in alternate years. GE credit: ArtHum, Wrt | AH, VL, WE.

#### **161B. Film History II: 1945 to present (4)**

Lecture—3 hours; film viewing—3 hours. Prerequisite: course 3 or University Writing Program 1. Cultural and aesthetic history of filmmaking from 1945 through the present. (Courses 161A and 161B need not be taken in sequence.) Offered in alternate years. GE credit: ArtHum, Wrt | AH, VL, WE.

#### **162. Film Theory and Criticism (4)**

Lecture—3 hours; film viewing—3 hours. Prerequisite: course 3 or University Writing Program 1. Film theory and criticism, with a study of ten major works of international film art. Offered in alternate years. GE credit: ArtHum, Wrt | AH, VL, WE.

#### **163. Literary Study in the British Isles (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Course 3 or University Writing Program 1. Enrollment by application only through the Education Abroad Center. Literary Study in the British Isles: On-site study of the literature, film, and/or performance of the British Isles. May be repeated two times if subject matter differs. GE credit: ArtHum, Wrt | AH, WC, WE. —S. (S.)

#### **164. Writing Science (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 3 or Science and Technology Studies 1, or equivalent. Texts and writing practices in the production of scientific knowledge. Surveys the literary structure of scientific arguments; history of scientific genres; rhetoric and semiotics in scientific culture; graphical systems in the experimental laboratory; narratives of science, including science fiction. (Same course as Science & Technology Studies 164.) GE credit: ArtHum, Wrt | AH, SL, WE. —Milburn

#### **165. Topics in Poetry (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 and course 45. Intensive examination of various topics expressed in poetry from all periods of English and American literature. May be repeated for credit when topic covers different poets and poems. GE credit: ArtHum, Wrt | AH, WE.

#### **166. Love and Desire in Contemporary American Poetry (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. Close reading of contemporary American poems on the

theme of love and desire by poets of diverse ethnicities and of gay, lesbian, and heterosexual orientations. Offered in alternate years. GE credit: Div, ArtHum, Wrt | ACGH, AH, WE.

#### **167. Twentieth-Century African American Poetry (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Twentieth-century African American poetry, including oral and literary traditions. Authors covered may include Gwendolyn Brooks, Countee Cullen, Robert Hayden, and Langston Hughes. Offered irregularly. GE credit: ArtHum, Div, Wrt | ACGH, AH, WE.

#### **168. 20th Century American Poetry (4)**

Lecture—3 hours; extensive writing. Prerequisite: course 3 or University Writing Program 1 or equivalent. Historical Study of American poetry since 1900, with thematic and formal focus at the instructor's discretion. Offered irregularly. GE credit: ArtHum, Wrt | ACGH, AH, WE.

#### **171A. The Bible as Literature: The Old Testament (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. May be taken independently of course 171B. Selected readings from the Old Testament illustrating various literary forms. Emphasis on the Pentateuch, the Historical Books, and the Wisdom Books. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

#### **171B. The Bible as Literature: Prophets and New Testament (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. May be taken independently of course 171A. Selected readings from the Old Testament prophets and the New Testament. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

#### **172. Video Games and Culture (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or Technocultural Studies 1 or Science and Technology Studies 1 or equivalent. Critical approaches to the study of video games, focusing on formal, historical, and cultural modes of analysis. History of software and hardware in North American and global contexts. Relations of games to society, politics, economics, literature, media, and the arts. (Same course as Cinema and Technocultural Studies 172 and Science and Technology Studies 172.) GE credit: ArtHum or SocSci | ACGH, AH or SS, VL.

#### **173. Science Fiction (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 3 or Science and Technology Studies 1 or equivalent. Literary modes and methods of science fiction. Representative texts, authors, and themes of the genre—e.g., time travel, alternative universes, and utopias. Relations of science fiction to science, philosophy, and culture. (Same course as Science and Technology Studies 173.) GE credit: ArtHum, Wrt | AH, WE.

#### **175. American Literary Humor (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1, or standing above freshman level. American humorous vision of man, nature, and the supernatural. Includes one or more of the following: colonial humor; southwestern and New England humor; pre- and post-Civil War masters; local colorists; journalistic gadflies; anti-provincialists; modernist poets and prose writers; black humor. Offered irregularly. GE credit: ArtHum, Wrt | ACGH, AH, WE.

#### **177. Study of an Individual Author (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 110A or 110B. In-depth study of an author's works; historical context; relation to predecessors and contemporaries; critical reception; influence. May be repeated one time if author differs. GE credit: Wrt | AH, WE.

**178. Topics in Nations, Regions, and Other Cultural Geographies (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or equivalent. Literary productions of a local, regional, national, transnational, or other geographical formation; e.g., the global South; literature of Hawaii; literature of Australia. May be repeated two times for credit. GE credit: ArtHum, Div, Wrt | AH, WE.

**179. Topics in Comparative American Literatures (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or equivalent. Comparative study of what constitutes "American" literature. Possible emphases: North American or Latin American literature; Pacific Rim or Circum-Atlantic approaches; interrelations among different modes of racialization within and beyond U.S. borders. May be repeated two times for credit when topic differs. GE credit: ArtHum, Div, Wrt | ACGH, AH, DD, WE.

**180. Children's Literature (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. Historical backgrounds and development of types of children's literature, folklore and oral tradition, levels of interest, criticism and evaluation, illustration and bibliography. GE credit: ArtHum, Wrt | AH, WE.

**181A. African American Literature to 1900 (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. African American literature from the colonial period to 1900. Particular attention to the rapid development of the African American literary culture from a primarily oral tradition to various literary genres, including the slave narrative. GE credit: ArtHum, Div, Wrt | ACGH, AH, DD, WE.

**181B. African American Literature 1900-Present (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. Major African American writers in the context of cultural history from 1900 to the present. Writers may include Richard Wright, Ann Petry, James Baldwin, Ralph Ellison, Paule Marshall, Toni Morrison, Alice Walker, Clarence Major. GE credit: ArtHum, Div, Wrt | ACGH, AH, DD, WE.

**182. Literature of California (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. California literature in the context of California's social, political, and intellectual history. Reading of poetry, fiction, and essays. Emphasis on nineteenth- and twentieth-century naturalists, turn of the century novelists, the Beats, and writers of the last two decades. GE credit: ArtHum, Div, Wrt | ACGH, AH, WE.

**183. Young Adult Literature (4)**

Lecture—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1, or equivalent. Theoretical, critical, and literary issues informing the study and teaching of American young adult literature. GE credit: ArtHum | AH, WE.

**184. Literature and the Environment (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. Historical and/or thematic survey of topics in writing about the environment. GE credit: ArtHum, Wrt | AH, WE.

**185A. Women's Writing I (4)**

Lecture/discussion—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1. Women's Writing in English before 1800; organized by period, place, genre, or theme. GE credit: ArtHum, Div, Wrt | AH, WE.

**185B. Women's Writing II (4)**

Lecture/discussion—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1. Women's Writing in English

from 1800 to 1900; organized by period, place, genre, or theme. GE credit: ArtHum, Div, Wrt | AH, WE.

**185C. Women's Writing III (4)**

Lecture/discussion—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1. Women's Writing in English after 1900; organized by period, place, genre, or theme. Offered irregularly. GE credit: Div, Wrt | AH, WE.

**186. Literature, Sexuality, and Gender (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically focused intensive examinations of gender and sexuality in British and American literature. GE credit: ArtHum, Div, Wrt | AH, WE.—W.

**187A. Topics in Literature and Media (4)**

Seminar—3 hours; film viewing—3 hours. Prerequisite: course 110A or 110B; consent of instructor. Group study of a topic centered on the relationships between literature and film or other moving-image media. GE credit: Wrt | AH, WE.

**188A. Topics in Literary and Critical Theory (4)**

Seminar—3 hours; term paper. Prerequisite: course 110A or 110B; consent of instructor. Intensive examination of theories addressing a particular problem, topic, or question. GE credit: Wrt.

**189. Seminar in Literary Studies (4)**

Seminar—3 hours; term paper. Prerequisite: course 110A or 110B. Intensive, focused study of literature at an advanced level. May be organized by topic, author, period, movement, or genre. High participation. GE credit: ArtHum, Wrt | AH, WE.

**192. Internship in English (1-12)**

Internship—3-36 hours. Prerequisite: course 3 or University Writing Program 1. Internships in fields where students can practice their skills. A maximum of four units is allowed toward the major in English. May be repeated for credit for a total of 12 units. (P/NP grading only.)—F, W, S. (F, W, S.)

**194H. Seminar for Honors Students (4)**

Seminar—3 hours; term paper. Prerequisite: course 110A or 110B; one advanced study course; admission to English Department Senior Honors Program in Literature, Criticism, and Theory. Preparation for writing an honors thesis in course 195H. Limited enrollment; high level of participation expected. GE credit: ArtHum | AH, WE.—W. (W.)

**195H. Honors Thesis (4)**

Independent study—12 hours. Prerequisite: course 194H. Preparation of a thesis, under the supervision of an instructor. Students satisfying requirements for the general major or the teaching emphasis write on a scholarly or critical subject; creative writing students submit a volume of poems or fiction. GE credit: ArtHum | AH, WE.

**197T. Tutoring in English (1-5)**

Tutoring—1-5 hours. Prerequisite: upper division standing and consent of Chairperson. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. Does not fulfill requirement for major. May be repeated up to 8 units for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

**197TC. Community Tutoring in English (1-4)**

Tutoring—1-4 hours. Prerequisite: upper division standing and a major in English; consent of chairperson. Field experience, with individuals or in classroom in instruction of English language, literature, and composition. Does not fulfill requirement for major. May be repeated for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

**198. Directed Group Study (1-5)**

Prerequisite: one course from English 3, 5F, 5P or University Writing Program 1. (P/NP grading only.)

**198F. Student Facilitated Course (1-4)**

Prerequisite: course 3 or University Writing Program 1; consent of instructor. Student facilitated course intended primarily for upper division students. (P/NP grading only.) Offered irregularly.

**198S. Directed Group Study (4)**

Lecture/discussion—4 hours. Prerequisite: course 163S concurrently. Group study will be closely tied to the texts and periods studied in course 163S. Investigations of historical sites, museums, galleries, and performances. To be taught in London. (P/NP grading only.)—S. (S.)

**199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.)—F, W, S. (F, W, S.)

**199FA. Student Facilitated Teaching (1-4)**

Prerequisite: course 3 or University Writing Program 1; consent of instructor. STU FAC. Under the supervision of a faculty member, an undergraduate student teaches a course under 98F/198F. (P/N grading only.) Offered irregularly.

**199FB. Student Facilitated Teaching (1-4)**

Prerequisite: course 3 or University Writing Program 1; consent of instructor. STU FAC. Under the supervision of a faculty member, an undergraduate student teaches a course under 98F/198F. (P/N grading only.) Offered irregularly.

**Graduate****200. Introduction to Graduate Studies in English (4)**

Seminar—3 hours; term paper or discussion—1 hour. Prerequisite: graduate standing. Introduction to literary scholarship with special attention to the elements of professionalism and to different modes of literary investigation. (S/U grading only.)—F. (F.)

**205. Anglo-Saxon Language and Culture (4)**

Lecture—3 hours; conference and term paper. The language and culture of Anglo-Saxon England; readings in Old English prose and poetry. Offered in alternate years.

**206. Beowulf (4)**

Discussion—3 hours; oral and written reports; conferences with students. Prerequisite: course 205 or the equivalent. A study of the poem and the Heroic Age of Germanic literature. Offered in alternate years.

**207. Middle English (4)**

Discussion—3 hours; term paper. Study of the phonology, morphology, syntax, and lexicon between 1100 and 1500 with investigation of the regional dialects; pertinent facts on both the internal and external linguistic history; intensive reading of texts. Offered irregularly.

**210. Readings in English and American Literature (4)**

Seminar—3 hours; conference—1 hour. Prerequisite: upper division course in area studied. Content varies according to specialty of instructor. May be repeated if topic differs.

**225. Topics in Irish Literature (4)**

Seminar—3 hours; conference—1 hour. Prerequisite: graduate standing. Varied topics, including the nineteenth-century novel, contemporary Irish poetry, rise of the drama, or a study of a major author. May be repeated for credit if topic differs. Offered irregularly.

**230. Study of a Major Writer (4)**

Seminar—3 hours; conferences with individual students—1 hour; research papers. Artistic development of one major writer and his intellectual and literary milieu. May be repeated for credit when a different writer is studied.

**232. Problems in English Literature (4)**

Seminar—3 hours; conferences with individual students—1 hour. Selected issues in the current study and critical assessment of a limited period or topic in English literature. May be repeated for credit when different period or topic is studied. Offered irregularly.

**233. Problems in American Literature (4)**

Seminar—3 hours; conferences with individual students—1 hour; research papers. Selected topics for intensive investigation. May be repeated for credit when different topic or period is studied.

**234. Dramatic Literature (4)**

Lecture—3 hours; conference—1 hour. Historical introduction to dramatic theory; the genres of tragedy, comedy, and tragicomedy. May be repeated for credit if topic differs.

**235. Theory of Fiction (4)**

Seminar—3 hours; conference—1 hour. Prerequisite: graduate standing. Theories of fiction as they relate to the professional writer's practice of the craft. For students in the Creative Writing Program. May be repeated for credit when focus differs.

**236. Poetics (4)**

Seminar—3 hours; conference—1 hour. Prerequisite: graduate standing. Theories of poetry as revealed in structure, prosody, and idiom of British and American poems, variably approached—through intensive study of a single poet, historically, or theoretically—at the instructor's discretion. For students in the Creative Writing Program. May be repeated for credit when focus differs.

**237. Seminar for Writers (4)**

Seminar—3 hours; extensive writing. Prerequisite: graduate standing. Varied topics in the study of literature and literary culture craft and poetics from the perspective of the writer/practitioner. May be repeated two times for credit if focus differs. Offered irregularly.—W. (W.)

**238. Special Topics in Literary Theory (4)**

Seminar—3 hours; term paper. Prerequisite: course 237 or the equivalent. Advanced topics in literary theory and criticism. Preparation and evaluation of research paper. May be repeated for credit when topic and/or reading list differs. Offered in alternate years.

**240. Medieval Literature (4)**

Seminar—3 hours; conference—1 hour. Studies of Medieval literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

**242. Sixteenth-Century Literature (4)**

Seminar—3 hours; conference—1 hour. Studies in sixteenth-century literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

**244. Shakespeare (4)**

Seminar—3 hours; conference—1 hour. Studies in Shakespeare. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

**246. Seventeenth-Century Literature (4)**

Seminar—3 hours; conference—1 hour. Studies in seventeenth-century literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

**248. Eighteenth-Century Literature (4)**

Seminar—3 hours; conference—1 hour. Studies in eighteenth-century literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

**250. Romantic Literature (4)**

Seminar—3 hours; conference—1 hour. Studies in Romantic literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied. Offered irregularly.

**252. Victorian Literature (4)**

Seminar—3 hours; conference—1 hour. Studies in Victorian literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

**254. Twentieth-Century British Literature (4)**

Seminar—3 hours; conference—1 hour. Studies in twentieth-century British literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

**256. Early American Literature (4)**

Seminar—3 hours; conference—1 hour. Studies in Early American literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

**258. American Literature: 1800 to the Civil War (4)**

Seminar—3 hours; conference—1 hour. Studies in American literature from 1800 to Civil War. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

**260. American Literature: Civil War to 1914 (4)**

Seminar—3 hours; conference—1 hour. Studies in American literature from the Civil War to 1914. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

**262. American Literature after 1914 (4)**

Seminar—3 hours; conference—1 hour. Studies in American literature after 1914. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

**264. Studies in Modern British and American Literature (4)**

Seminar—3 hours; conference—1 hour. Studies in modern British and American literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied. Offered irregularly.

**270. Studies in Contemporary World Literature (4)**

Seminar—3 hours; conference—1 hour. Prerequisite: graduate standing, consent of instructor, with preference given to those enrolled in the masters program in Creative Writing. Emerging global, international or transnational techniques, theories, and individual works of contemporary world prose or poetry. Discussion, seminar reports, research papers. May be repeated for credit when topic differs.

**280. Seminar in Research Practices (4)**

Lecture/discussion—3 hours; project. Must have passed Departmental Preliminary Exam. Study of various practical and technical skills needed to perform research in literary studies. Course materials to be selected by the instructor. Evaluation based on student projects that involve hands-on application of skills taught in the seminar. May be repeated for credit when topic differs.—S. (S.)

**285. Literature by Women (4)**

Seminar—3 hours; conference—1 hour. Studies in literature by women and the theoretical approaches to literature by women. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when topic and/or reading list differs. Offered irregularly.

**287. Topics in Literature and Media (4)**

Seminar—3 hours; film viewing—3 hours. Prerequisite: graduate standing. Study of a topic centered on film or other moving-image media. Course materials

to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when topic differs.

**288. Prospectus Workshop (2)**

Conference—2 hours. Must have passed Departmental Preliminary Exam. Training in writing the dissertation prospectus. Participation in group discussions of preparatory assignments and final proposal. (S/U grading only.)

**289. Article Writing Workshop (2)**

Conference—2 hours. Prerequisite: consent of instructor. Class size limited to 12 students; nomination for admission by Dissertation Director. Training in preparing an article for publication. Participation in group discussions of article drafts. May be repeated one time for credit. (S/U grading only.)

**290. Creative Writing: Special Topic (4)**

Seminar—3 hours; conference—1 hour. Prerequisite: consent of instructor. Writing that falls outside the generic confines of traditional genres (fiction, poetry, and nonfiction) or traditional workshop formats. Evaluation of written materials and individual student conferences. May be repeated for credit. Offered irregularly.—F. (F.)

**290F. Creative Writing: Fiction (4)**

Seminar—3 hours; conference—1 hour. Prerequisite: consent of instructor; graduate standing, with preference given to those enrolled in master's program in Creative Writing. Writing of prose fiction. Evaluation of written materials and individual student conferences. May be repeated for credit.—F, W, S. (F, W, S.)

**290NF. Creative Writing: Non-Fiction (4)**

Seminar—3 hours; conference—1 hour. Prerequisite: consent of instructor; graduate standing; with preference given to those enrolled in the master's program in Creative Writing. Writing of literary non-fiction, with emphasis on autobiography, biography, memoir, the occasional or nature essay, or other non-fiction prose narratives. May be repeated for credit. Offered in alternate years.

**290P. Creative Writing: Poetry (4)**

Seminar—3 hours; conference—1 hour. Prerequisite: consent of instructor; graduate standing, with preference given to those enrolled in master's program in Creative Writing. Writing of poetry. Evaluation of written materials and individual student conferences. May be repeated for credit.—F, W, S. (F, W, S.)

**298. Directed Group Study (1-5)**

(S/U grading only.)—F, W, S. (F, W, S.)

**299. Individual Study (1-12)**

(S/U grading only.)—F, W, S. (F, W, S.)

**299D. Special Study for the Doctoral Dissertation (1-12)**

(S/U grading only.)—F, W, S. (F, W, S.)

**Professional****391. Teaching Creative Writing (2)**

Discussion—2 hours. Prerequisite: graduate standing; appointment as Teaching Assistant in the English. Designed for new instructors of English 5F or 5P; discussion of ways to facilitate creative writing workshops and to respond to student manuscripts. (S/U grading only.)—S. (S.)

**393. Teaching Literature and Composition (2)**

Discussion—2 hours. Prerequisite: graduate standing; appointment as Teaching Assistant in the English Department. Designed for new instructors of English 3 or the equivalent courses; discussion of problems related to teaching literature and composition to lower division students. (S/U grading only.)—S. (S.)

**396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

# Entomology and Nematology

Formerly the departments of Entomology and Nematology  
 (College of Agricultural and Environmental Sciences)  
 Steve Nadler, Ph.D., Chairperson of the Department  
 Joanna Chiu, Ph.D., Vice Chairperson of the Department  
**Department Office.** 367 Briggs Hall  
 530-752-0492; <http://entomology.ucdavis.edu>

## Faculty

James R. Carey, Ph.D., Distinguished Professor  
 Edward P. Caswell-Chen, Ph.D., Professor  
 Joanna Chiu, Ph.D., Associate Professor  
 Bruce D. Hammock, Ph.D., Distinguished Professor  
 Academic Senate Distinguished Teaching Award  
 Brian R. Johnson, Ph.D., Assistant Professor  
 Richard Karban, Ph.D., Professor  
 Lynn S. Kimsey, Ph.D., Professor  
 Karl Kjer, Ph.D., Professor, Schlinger Endowed Chair in Systematics  
 Sharon P. Lawler, Ph.D., Professor  
 Edwin Lewis, Ph.D., Professor  
 Steven A. Nadler, Ph.D., Professor  
 Christian Nansen, Ph.D., Assistant Professor  
 Jay Rosenheim, Professor  
 Academic Senate Distinguished Teaching Award  
 Diane E. Ullman, Ph.D., Professor  
 Rachel Vannette, Ph.D., Assistant Professor  
 Philip S. Ward, Ph.D., Professor  
 Becky B. Westerdahl, Ph.D., Professor  
 Neal M. Williams, Ph.D., Associate Professor  
 Louie H. Yang, Ph.D., Associate Professor  
 Frank G. Zalom, Ph.D., Distinguished Professor

## Emeriti Faculty

Oscar G. Bacon, Ph.D., Professor Emeritus  
 Peter S. Cranston, Ph.D., Professor Emeritus  
 Hugh Dingle, Ph.D., Professor Emeritus  
 John D. Edman, Ph.D., Professor Emeritus  
 Lester E. Ehler, Ph.D., Professor  
 Bruce F. Eldridge, Ph.D., Professor Emeritus  
 Howard Ferris, Ph.D., Professor Emeritus  
 Mary L. Flint, Ph.D., Specialist in Cooperative Extension, Emerita  
 Norman E. Gary, Ph.D., Professor Emeritus  
 Jeffrey Granett, Ph.D., Professor Emeritus  
 Albert A. Grigarick, Jr., Ph.D., Professor Emeritus  
 Penelope J. Gullan, Ph.D., Professor Emeritus  
 Bruce A. Jaffee, Ph.D., Professor Emeritus (Nematology)  
 Harry K. Kaya, Ph.D., Professor Emeritus (Entomology, Nematology)  
 Robert E. Page Jr., Ph.D., Professor Emeritus  
 Michael P. Parrella, Ph.D., Professor Emeritus (Plant Sciences)  
 Christine Y. S. Peng, Ph.D., Professor Emeritus  
 Robbin W. Thorp, Ph.D., Professor Emeritus  
 Thomas W. Scott, Ph.D., Professor Emeritus  
 Robert K. Washino, Ph.D., Professor Emeritus  
 Valerie M. Williamson, Professor Emeritus

## Affiliated Faculty

Anthony Cornel, Ph.D., AES Entomologist  
 Elina Nino, Ph.D., Specialist in Cooperative Extension  
 Larry Godfrey, Ph.D., Specialist in Cooperative Extension, AES Entomologist  
 Robert Kimsey, Ph.D., Lecturer  
 Shirley Luckhart, Ph.D., Adjunct Professor (Medical Microbiology and Immunology; School of Medicine)  
 Eric C. Mussen, Ph.D., Specialist in Cooperative Extension, Emeritus  
 William K. Reisen, Ph.D., Research Entomologist (Pathology, Microbiology and Immunology; School of Veterinary Medicine)

## The Major Program

The Entomology major is a general biological science program. The curriculum is designed to develop an understanding of fundamental biological concepts by studying insects. Insects offer unique opportunities to study biological systems and are model experimental animals. Many insects are either pests, or beneficial species that have great importance to the economy, environment or public health. Students may focus on specific areas of interest including agricultural entomology, insect systematics and evolution; behavior and ecology; medical entomology; and insect molecular biology, physiology and toxicology.

**The Program.** Students begin their study in entomology with selected insect biology courses. After completing these courses, students may enroll in courses in their particular area of interest. The Entomology Faculty encourages students to do research internships in their laboratories.

**Career Alternatives.** Entomology graduates find careers in many different areas of applied or basic biology. Graduates have the opportunity to continue in professional graduate programs such as veterinary or human medicine, or get advanced degrees leading to careers in biotechnology, conservation biology, or academic teaching and research. Many graduates have participated in internship programs with the California Department of Food and Agriculture and found careers in insect diagnostic laboratories, conducting insect surveys, and/or developing entomological collections. Other graduates have worked in agriculture in the area of insect pest management. Graduates are prepared for managerial and technical positions with state and federal agencies and in agricultural production and supporting industries. Some entomology graduates pursue careers in primary, secondary, and college level science education.

## B.S. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b> .....	<b>49-53</b>
Biological Sciences 2A, 2B, 2C .....	15
Chemistry 2A, 2B, 8A, 8B.....	16
Mathematics 16A-16B-16C or 17A-17B-17C or 21A-21B-21C .....	9-12
Physics 1A, 1B.....	6
Statistics 13, 32, or Plant Sciences 120, 21 or Engineering 5 .....	3-4

## Depth Subject Matter .....34-40

Microbiology 104, Plant Biology 148, Plant Pathology 120 or Microbiology 162 .....	3-5
Biological Sciences 101 .....	4
Entomology 105, Environmental Science and Policy 100 or Evolution and Ecology 101 .....	4
Evolution and Ecology 100.....	4
Biological Sciences 102 and 103 or Animal Biology 102 and 103.....	6-10
Entomology 100, 100L .....	6
At least 7 units from Entomology 102, 103, 104, 107, 109, or 116 or Nematology 110.....	7

## Restricted Electives.....34

Upper division Entomology and Nematology courses .....	14
Upper division electives related to student's interest with approval of adviser.....	20
Note: No more than a total of six units from Entomology 192, 197T and 199 may count toward fulfilling depth subject matter or restricted elective units.	

## Total Units for the Major .....117-127

**Major Adviser.** S. Lawler, S. Nadler

## Minor Program Requirements:

The Department of Entomology has five minor programs open to students in other disciplines who are interested in rounding out their academic study with a concentration in the area of entomology.

	UNITS
<b>Insect Biology</b> .....	<b>19-23</b>

Entomology 100, 100L .....	6
At least seven units from Entomology 102, 103, 104, 105 107, 109 .....	7
At least two additional upper division Entomology courses (except courses 192, 198, 199).....	6-10

## Agricultural Pest Management .....21-23

Entomology 100, 100L, 110, 135 .....	15
At least two courses from: Nematology 100, Plant Sciences 105, 176, Plant Pathology 120.....	6-8

## Insect Ecology and Evolution .....20-21

Entomology 100, 100L, and Entomology 105 or 104 .....	9-10
At least seven units from Entomology 103, 107, 109, 116, 158 .....	7
Evolution and Ecology 149 or Environmental Science and Policy 121 .....	4

## Medical-Veterinary Entomology .....19

Entomology 100, 100L, 104, 153, 156.....	15
At least four units from Entomology 156L, 158; Microbiology 162 .....	4

## Forensic Entomology .....22

Entomology 100, 100L, 102, 158 .....	13
Biological Science 2A.....	5
Entomology 105, Evolution and Ecology 101, or Environmental Science and Policy 100.....	4

**Minor Adviser.** S. Lawler, S. Nadler

**Graduate Study.** The Department of Entomology offers a program of study and research leading to the M.S. and Ph.D. degrees. See *Graduate Studies*, on page 120 and the Graduate Announcement, for further details.

**Graduate Advisers.** See <http://entomology.ucdavis.edu/Graduate/>.

**Related Courses.** See courses in Nematology.

## Courses in Entomology (ENT)

### Lower Division

#### 1. Art, Science and the World of Insects (3)

Lecture—3 hours; laboratory—3 hours. Fusion of entomology and art to create an appreciation of insect biology, ecology, interactions with humans and importance in human culture. Multidisciplinary approaches in education and career paths in entomology and art. GE credit: ArtHum or SciEng or SocSci | AH or SE or SS, OL, VL, WE.—S. (S.) Ullman

#### 2. Biodiversity (3)

Lecture—2 hours; lecture/discussion—1 hour. Introduction to nature, scope and geographical distribution of biodiversity (the diversity of life, with emphasis on plants and animals, especially insects). Humans and biodiversity—domestication, aesthetics, ethics and valuation. Species richness and "success." Biodiversity through time; monitoring, evaluation and conservation. Biomes—global, continental and Californian. (Same course as Evolution and Ecology 2.) GE credit: SciEng, Wrt | SE, SL, WE.—F. (F.)

#### 10. Natural History of Insects (3)

Lecture—3 hours. Introduction to the insects detailing their great variety, structures and functions, habits, and their significance in relation to plants and animals including man. Designed for students not specializing in entomology. Not open for credit to students who have had course 100, but students who have taken this course may take course 100 for credit. GE credit: SciEng | SE, SL.—W. (W.) Johnson, Kjer

#### 90X. Special Topics in Entomology (2)

Seminar—2 hours. Prerequisite: consent of instructor. Freshman seminar course for in-depth examination of a special topic within the subject area. May be repeated two times for credit. (P/NP grading only.)—F, W, S.

**92. Internship (1-12)**

Internship—3–36 hours. Prerequisite: consent of instructor. Work-learn experience on and off campus in all subject areas offered by the department, supervised by a member of the faculty. May be repeated up to 12 units of credit. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5)**  
(P/NP grading only.)**Upper Division****100. General Entomology (4)**

Lecture—3 hours; term paper. Prerequisite: Biological Sciences 1B. Biology, anatomy, physiology, development, classification, ecology and relation of insects to human welfare. GE credit: SciEng, Wrt | WE. —F, S. (F, S.) L. Kimsey

**100L. General Entomology Laboratory (2)**

Laboratory—6 hours. Prerequisite: course 100 (may be taken concurrently). Anatomy, development, population ecology, methods of collecting, classification and identification of insects of all orders and of major families. GE credit: Wrt | VL. —F. (F.) L. Kimsey

**101. Functional Insect Morphology (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 100. Study of the basic external and internal structures, organs and tissues of insects, with emphasis on functional systems. Functional anatomy, histology and fine structures of important organs and tissues will be discussed. GE credit: SciEng. —W. (W.)

**102. Insect Physiology (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or course in physiology or invertebrate zoology. Processes by which insects maintain themselves, reproduce, and adapt to environment. Insects as models for basic/applied research through detailed analysis of metabolic, physiological, and behavioral processes. Emphasis on analysis of methodology, fact, and theory. GE credit: SciEng | SE, WE. —W. (W.) Chiu

**103. Insect Systematics (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: introductory course in zoology or entomology. Principles and methods of systematics, with particular reference to insects. Emphasis on different theories of classification, and analysis of phylogenetic relationships. Offered in alternate years. GE credit: SciEng, Wrt. —S.

**104. Behavioral Ecology of Insects (3)**

Lecture—3 hours. Prerequisite: introductory biology or zoology. Basic principles and mechanisms of insect behavior and ecology. An evolutionary approach to understanding behavioral ecology of insects. GE credit: SciEng. —W. (W.) Lewis

**105. Insect Ecology (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: Biological Sciences 2B. Introduction to insect ecology combining fundamental concepts and questions in ecology with ideas, hypotheses and insights from insects. Integrates aspects of individual, population, community and ecosystem ecology. Emphasis on the scientific process: observing nature, asking testable questions, and communication. Offered in alternate years. GE credit: SciEng | OL, SE, SL, WE. —F. (F) Yang

**107. California Insect Diversity (5)**

Lecture—1 hour; laboratory—6 hours; fieldwork—6 hours. Prerequisite: an introductory course in entomology. Survey of the diversity of insects from selected ecological zones in California with emphasis on collection, identification, and natural history. Offered in alternate years. GE credit: SciEng, Wrt | SE. —S. Ward

**109. Field Taxonomy and Ecology (7)**

Lecture—2 hours; laboratory—36 hours; five-week course. Prerequisite: an introductory course in entomology or consent of instructor. The study of insects in their natural habitats; their identification and ecology. Offered in alternate years. GE credit: SciEng, Wrt | SE. —(Su.) Ward

**110. Arthropod Pest Management (5)**

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Science 1B. Development of the ecological basis for the integrated pest management paradigm with emphasis on agriculture. Ecological and practical aspects of control tactics. Laboratory emphasizes identification of pests and beneficials of agriculture and urban situations. GE credit: SciEng, Wrt | SE, WE. —W. (W.) Godfrey

**116. Freshwater Macroinvertebrates (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 2B or equivalent. Limited enrollment. Biology, ecology and taxonomy of freshwater macroinvertebrates, including insects, crustaceans, molluscs, worms, leeches, flatworms and others. Adaptations to life in freshwater. Aquatic food webs. Uses of macroinvertebrates in water quality monitoring. Field trips during regular lab hours. GE credit: SciEng | SE, SL. —S. (S.) Lawler

**116L. Aquatic Insect Collection (2)**

Laboratory—4 hours; field work—2 hours. Prerequisite: course 100L or 116 (may be taken concurrently), or prior experience with insect/arthropod identification to Family level. Restricted to 25 students. Collection of aquatic insects and identification to the Family level. Collections will require two, one-day weekend field trips (by arrangement). Collection requirement is 40 Families. —S. (S.) Lawler

**117. Longevity (4)**

Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Nature, origin, determinants, and limits of longevity with particular reference to humans; emphasis on implications of findings from non-human model systems including natural history, ecology and evolution of life span; description of basic demographic techniques including life table methods. (Same course as Human Development 117.) GE credit: SciEng, Wrt | SE, SL, WE. —F. Carey

**119. Apiculture (3)**

Lecture—3 hours; papers. Biology and behavior of honeybees; communication, orientation, social organization, foraging activities, honey production, pollination activities. GE credit: SciEng, Wrt | OL, VL, WE. —S. (S.) Johnson

**123. Plant-Virus-Vector Interaction (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 2A, Biological Sciences 101; Plant Biology 105, Plant Pathology 120, and course 100 recommended. Analysis of interactions necessary for viruses to infect plants. Interactions among insect vectors and host plants involved in the plant-virus life cycle. Evolutionary aspects of the molecular components in viral infection and modern approaches to the interdiction of viral movement. (Same course as Plant Biology 123 and Plant Pathology 123.) Offered in alternate years. GE credit: SE, SL, WE. —F. Lucas, Gilbertson, Ullman

**135. Introduction to Biological Control (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100 or 110. Principles of biological control of arthropod pests and weeds. Biology of pathogens, entomopathogenic nematodes, parasitoids, and predators. Implementation in classical and augmentative biological control. Role of biological control in pest management. Offered in alternate years —F. Lewis

**153. Medical Entomology (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, upper division standing in one of the biological sciences, or consent of instructor. Basic biology and classification of medically important arthropods with special emphasis on the ecology of arthropod-borne diseases and principles of their control. Relationships of arthropods to human health. GE credit: SciEng, Wrt | SE, SL, WE. —W. (W.)

**156. Biology of Parasitism (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 1A or consent of instructors. Lectures on the biological and ecological aspects affecting host-parasite relationships using selected examples from protozoan and metazoan fauna. GE credit: SciEng | SE. —S. (S.) Nadler

**Entomology and Nematology****323****156L. Biology of Parasitism Laboratory (1)**

Laboratory—3 hours. Prerequisite: course 156 (concurrently) or consent of instructor. Laboratory demonstrations using selected examples of protozoan and metazoan organisms along with various techniques used in parasitology to exemplify concepts presented in the lecture course. GE credit: SciEng, Wrt | SE. —S. (S.) Nadler

**158. Forensic Entomology (3)**

Lecture—2 hours; laboratory—4 hours. Prerequisite: Biological Sciences 1B or Entomology 100, upper division standing. Arthropods, their general biology, succession, developmental cycles and population biology in matters of criminal prosecution and civil litigation. Emphasis on basic arthropod biology, ecological and developmental concepts and methods, development of reasoning abilities, implication, development of opinions and evidence. GE credit: SciEng or SocSci, Wrt | WE. —S. (S.) R. Kimsey

**180A. Experimental Ecology and Evolution in the Field (4)**

Lecture/laboratory—3 hours; fieldwork—3 hours. Prerequisite: course 105, or Environmental Science and Policy 100; Evolution and Ecology 100; Evolution and Ecology 101. Experimental design in field ecology. Examination of primary literature, experimental design, independent and collaborative research, analysis of data, development of original research paper based on field experiments. (Same course as Evolution and Ecology 180A.) Offered in alternate years. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | QL, SE, VL, WE. —(W.) Yang

**180B. Experimental Ecology and Evolution in the Field (4)**

Lecture/laboratory—3 hours; fieldwork—3 hours. Prerequisite: Evolution and Ecology or Entomology 180A; Evolution and Ecology 100, Evolution and Ecology 101, or Environmental Science and Policy 100; course 105. Experimental design in field ecology. Examination of primary literature, experimental design, independent and collaborative research, analysis of data, development of original research paper based on field experiments. (Same course as Evolution and Ecology 180B.) Offered in alternate years. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | QL, SE, VL WE. —(S.) Yang

**192. Internship (1-12)**

Internship—3–36 hours. Prerequisite: completion of 84 units and consent of instructor. Laboratory experience or fieldwork off and on campus in all subject areas offered in the Department of Entomology. Internships supervised by a member of the faculty. (P/NP grading only.)

**197T. Tutoring in Entomology (1-3)**

Discussion—1-3 hours. Leading small discussion groups. Preview assignments and prepare guidelines for discussion. (P/NP grading only.)

**198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)**  
(P/NP grading only.)**Graduate****212. Molecular Biology of Insects and Insect Viruses (3)**

Lecture—3 hours. Prerequisite: consent of instructor. A molecular biological analysis of insect systematics, physiology, and defense mechanisms. Molecular biology of insect viruses. Baculovirus expression vectors and post-translation modification of expressed polypeptides. Biological control of using neuropeptides and toxin genes in insect viruses. Offered in alternate years. —W. (W.)

**214. Vector-borne Infectious Diseases: Changing Patterns (2)**

Lecture/discussion—2 hours. Prerequisite: consent of instructor required. Restrictions: open to graduate students, MPVM and MPH students, DVM and medical students with second- or third-year standing.

Open to upper division undergraduate students with consent of instructor(s). Vector-borne infectious diseases especially as they relate to changing patterns associated with climatic changes, trade and population movement. Same course as PMI 214. —F. (F.) Lanzaro, Reisen

### 225. Terrestrial Field Ecology (4)

Seminar—1 hour; field work—12 hours. Prerequisite: introductory ecology and introductory statistics or consent of instructor. A field course conducted over spring break and four weekends at Bodega Bay, emphasizing student projects. Ecological hypothesis testing, data gathering, analysis and written and oral presentation of results. (Same course as Ecology 225/Population Biology 225.) —S. (S.) Karban

### 230. Advanced Biological Control (4)

Lecture—2 hours; laboratory—6 hours. Prerequisite: graduate or upper division standing in biological science or consent of instructor. Principles and current issues in biological control of arthropod pests and weeds; laboratory devoted to identification and life history of the major groups of parasitic and predaceous arthropods. Offered irregularly. —(F.)

### 253. Advanced Medical Entomology (3)

Lecture—2 hours; discussion—1 hour. Prerequisite: one upper division course in entomology (other than course 153) and one course in microbiology; course 153 strongly recommended. An analysis of several arthropod-borne human diseases with emphasis on the relationships of the biology of the vector to the ecology of the disease. Discussion includes demonstration of vectors and techniques. Offered irregularly. —(S.)

### 290. Exploratory Topics in Entomology (2)

Seminar—2 hours. Interdisciplinary topics in entomology, including innovative applications of entomological concepts to other fields of research and human endeavor (e.g. medicine, technology, art, criminology). May be repeated for up to 8 units of credit when topic differs. —F, W, S.

### 291. Current Topics in Medical and Veterinary Entomology (2)

Seminar—2 hours. Prerequisite: course 153. Discussion of parasitology, ecology and epidemiology related to vectors of pathogens causing disease in humans and animals. May be repeated one time for credit. Offered irregularly. —F, W, S. R. Kimsey

### 292. Current Topics in Insect Physiology and Behavior (2)

Seminar—2 hours. Prerequisite: course 102 if topic is physiology, a course in behavior if topic is behavior, or either if topic bridges both. Analysis of contemporary advances in insect physiology, biochemistry and/or behavior. Interpretation and description of physiological and behavioral mechanisms and functions. Application of general principles to solution of problems in the laboratory and field. May be repeated for up to 8 units of credit if topic differs. Offered irregularly. —F, W, S.

### 293N. Current Topics in Insect Biotechnology and Genomics (2)

Seminar—2 hours. Prerequisite: course 212. Discussion of advances in insect biotechnology, including genetic engineering and genomics. May be repeated for up to 6 units of credit if topic differs. Offered irregularly. —F, W, S. Hammock

### 294. Current Topics in Insect Ecology, Evolution, and Systematics (2)

Seminar—2 hours. Prerequisite: course 103, general course in ecology or evolution. Discussions of advanced topics in ecology, evolution and systematics with emphasis on analysis of factors influencing the distribution, abundance, adaptations and evolutionary relationships of insects. Includes consideration of applications of basic theory (e.g. biological control). May be repeated for credit up to eight units if topics differs. Offered irregularly. —F, W, S.

### 295. Current Topics in Agricultural Entomology and Bee Biology (2)

Seminar—2 hours. Prerequisite: course 110 if topic covers pests and beneficial predators, course 119 if topic is bee biology, or either if topic bridges both. Discussion of advanced topics about the biology, ecology, behavior, and management of pest and beneficial insects. May be repeated for up to 8 units of credit if topic differs. Offered irregularly. —F, W, S.

### 297N. Seminar in Entomology (1)

Seminar—1 hour. Weekly entomology seminar. May be repeated up to 9 units of credit if topic differs. (S/U grading only.) —F, W, S. (F, W, S.)

### 298. Group Study (1-5)

(S/U grading only.)

### 299. Research (1-12)

(S/U grading only.)

## Environmental and Resource Sciences

(College of Agricultural and Environmental Sciences)

This major was discontinued as of Fall 2008; see [Environmental Science and Management](#), on page 325.

## Environmental Geology

(College of Letters and Science)

The minor in Environmental Geology examines the multidisciplinary factors of geology and related earth science fields, and planning and resources oriented programs. Students in the minor are encouraged to participate in internship programs that assist them in solidifying the Environmental Geology minor with their Geology major or other major field areas that include geologic components.

The minor is sponsored by the Department of Earth and Planetary Sciences in 2119 Earth and Physical Sciences Building.

### Minor Program Requirements:

UNITS

#### Environmental Geology ..... 25-26

Geology 130, 134, and Environmental Science and Management 186 .....	9
Soil Science 118 .....	4
Hydrologic Science 141 or Civil and Environmental Engineering 142 .....	4
Two courses chosen from Environmental Science and Policy 160, 171, 179,	
Hydrologic Sciences 144, 146 .....	8-9

**Minor Adviser.** See Geology major advisers

## Environmental Horticulture

(College of Agricultural and Environmental Sciences)

**Faculty.** See [Plant Sciences](#), on page 514.

**Major Program.** See [Environmental Horticulture and Urban Forestry](#), on page 324.

### Minor Program Requirements:

UNITS

#### Environmental Horticulture ..... 23-25

Environmental Horticulture 6 and 105 .....	8
Plant Sciences 171 .....	4
Select three courses from: Environmental Horticulture 100, 120, 125, 130,	
133 .....	11-13

**Minor Adviser.** A. Volder ([Plant Sciences](#))

**Related Undergraduate Programs.** See the undergraduate majors in [Ecological Management and Restoration](#), on page 250, [Plant Biology](#), on page 509, and [Plant Sciences](#), on page 514.

**Graduate Study.** For graduate study related to this field, see the M.S. and Ph.D. degree programs in the graduate groups of Horticulture and Agronomy, Plant Biology, and Ecology. Also see [Graduate Studies](#), on page 120.

**Related Courses.** See [Plant Biology](#) and [Plant Sciences](#).

## Courses in Environmental Horticulture (ENH)

Questions pertaining to the following courses should be directed to the instructor or to the Plant Sciences Advising Office in 1224 Plant and Environmental Sciences Building 530-752-7738.

### Lower Division

#### 1. Introduction to Environmental Horticulture/Urban Forestry (3)

Lecture—3 hours. Introduction to the use of plants to enhance the physical, visual and social environment, the use of ecological principles in developing sustainable, low maintenance landscape systems, and the career opportunities in these areas. GE credit: SciEng | SE, SL. —F. (F.) Volder

#### 6. Introduction to Environmental Plants (4)

Lecture—1 hour; discussion—2 hours; laboratory—3 hours. Classification, nomenclature and variation of environmental plants. The use of floral and vegetative characteristics and terminology to key unknown plants. Characteristics of plant groups and basics of climate, soils and plant selection. Identification of 150 common landscape plants. GE credit: SciEng | SE, VL. —F. (F.) Young

### Upper Division

#### 100. Urban Forestry (4)

Lecture—2 hours; laboratory—3 hours; term paper. Prerequisite: Biological Sciences 1C or Plant Sciences 2. Principles and practices of planning and managing urban vegetation. Basics of tree appraisal, natural resource inventory, and development of long term urban forest management plans. GE credit: SciEng | SE. —F. (F.) Cadenasso, Volder

#### 101. Trees of the Urban Forest (2)

Lecture—1 hour; laboratory—2 hours. Prerequisite: course 6 or consent of instructor. Identification and evaluation of 200 tree species of the urban forest on campus, in the Arboretum, and in the city of Davis; appraised and aesthetic values, condition, and branch structure; contribution of trees to this ecosystem. Bicycle required. GE credit: SciEng | VL, SE. —F. (F.) Harding

#### 102. Physiological Principles in Environmental Horticulture (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1C. Physiological principles and processes essential to floriculture, nursery crop production, turficulture and landscape horticulture. Emphasis on the control of vegetative and reproductive development for a broad species range in greenhouse and extensive landscape environments. GE credit: SciEng | SE.

#### 105. Taxonomy and Ecology of Environmental Plant Families (4)

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 6 or consent of instructor. Classification and identification of introduced and native species used in urban forests, with emphasis on floral and vegetative characteristics of the prominent families of angiosperms and gymnosperms, adaptations to environmental variations in western landscapes, and horticultural classification. GE credit: SciEng | VL, SE. —S. (S.) Harding

#### 120. Management of Container Media (3)

Lecture—2 hours; laboratory—3 hours. Prerequisite: Soil Science 10. Principles of soil science and practices related to management of container media are taught, emphasizing appropriate use of soils and amendments, irrigation, and fertilizers. Physical and

chemical properties are tested and effects of management on crops are evaluated in the laboratory. GE credit: SciEng | QL, SE, WE.—F. (F.) Evans

### **125. Greenhouse and Nursery Crop Production (5)**

Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Plant Sciences 2 or Biological Sciences 1C. Principles and techniques for the production of ornamental greenhouse and nursery crops. Hands-on experience producing greenhouse crops. Optional weekend field trip. GE credit: SciEng | SE, WE.—W. (W.) Lieth

### **133. Woody Plants in the Landscape: Growth, Ecology and Management (4)**

Lecture—3 hours; laboratory—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 1C or the equivalent preparation in plant biology. Principles and practices of managing trees and shrubs in the urban landscape and other managed environments. Topics include woody plant form; growth response and adaptation; tree management in relation to soil, moisture, climate; plant problems. GE credit: SciEng | SE, WE.—W. (W.) Berry, Volder

### **150. Genetics and Plant Conservation: The Biodiversity Crisis (3)**

Lecture/discussion—3 hours. Prerequisite: Biological Sciences 1C or the equivalent. Conservation of genetic diversity, measurement of diversity, threats to diversity and reasons for protection, the process of extinction, distribution of diversity, determination of what to conserve and means of conservation. Examples drawn largely from forest tree species. GE credit: SciEng | SE, SL.—F. (F.) Neale

### **160. Restoration Ecology (3)**

Lecture—3 hours. Prerequisite: Plant Biology/Evolution & Ecology 117 or Evolution & Ecology 121 or Plant Biology 147 or equivalent course in ecology/plant ecology. Conceptual bases of restoration ecology; tools used by restoration ecologists to solve practical problems; scope and success of actual restoration projects. GE credit: SciEng | SE, SL, WE.—S. (S.) Eviner

### **160L. Restoration Ecology Laboratory (1)**

Laboratory/discussion—3 hours. Prerequisite: course 160 (may be taken concurrently). Companion field course to course 160. A series of part-day and all day visits to various field sites, involving site evaluations, guest field presentations by local restorationists, and actual restoration activities. Not open for credit to students who completed course 160 prior to spring 2004. GE credit: SciEng | SE, SL.—S. (S.) Eviner

## **Environmental Horticulture and Urban Forestry**

(College of Agricultural and Environmental Sciences)

**Faculty.** See Department of [Plant Sciences](#), on page 514.

**The Major Program.** Students majoring in Environmental Horticulture and Urban Forestry learn how plants improve the environment and the quality of our lives. The major focuses on the biological and physical concepts and horticultural principles of plant production, management of plants and plant ecosystems in landscape settings and sociological aspects of plant/people interactions in the urban environment. Plants are used to revegetate and restore disturbed landscapes, control erosion and reduce energy and water consumption. The ornamental use of plants to improve the aesthetic quality of urban and rural landscapes, recreational areas, interiorscapes and commercial sites is an important aspect of this major. Students may select one or more of the following three areas of specialization: Floriculture/Nursery, Plant Biodiversity/Restoration, or Urban Landscape Management.

**Internships and Career Opportunities.** Students are encouraged to develop internships on or

off campus to augment their activities in the classroom and laboratory. Internships are available with the department's greenhouse facility, the UC Davis Arboretum, landscape designers, local nurseries, government agencies, regional non-profits, and restoration firms. Career opportunities in this field include growing and/or managing plants in a variety of settings, including nurseries and arboreta, consulting as an arborist, or as an urban, landscape, or restoration horticulturist; business ownership; park management and landscape contracting; working in the public or private sector, or for non-profit organizations.

### **B.S. Major Requirements:**

UNITS

Communications 1 recommended as part of the College English Composition Requirement or the Words and Images Core Literacy Component.

### **Preparatory Subject Matter .....56-62**

Environmental Horticulture 1 and 6 .....	7
Landscape Architecture 30 .....	4
Biological Sciences 2A, 2B, and Plant Sciences 2 .....	14
Chemistry 2A-2B .....	10
Environmental Science and Policy 1 or 10 or 30 .....	3-4
Physics 1A-1B .....	6
Plant Sciences 21 .....	3
Mathematics 16A or Statistics 13 .....	3-4
University Writing Program 102B, 102G, 104E, or other upper division composition course (may overlap with college composition requirement; may be satisfied by passing the English Composition Exam) .....	0-4
Lower division restricted electives .....	6
Select one lower division resource science course and one lower division social science/humanities course in consultation with adviser; minimum 6 units.	

### **Depth Subject Matter .....42-46**

Environmental Horticulture 102 or Plant Sciences 100A .....	3-4
Environmental Horticulture 105 or Plant Sciences 102 or Plant Biology 108 .....	4-5
Plant Biology 117 or Plant Sciences 150 ..	4
Plant Sciences 171 .....	4
Soil Science 100 .....	5
Select two courses from Entomology 110, Nematology 100, Plant Pathology 120, Plant Sciences 105 or 176 .....	7-9
Internship or research; must be approved by major adviser .....	3
Upper division restricted electives .....	12
Select two upper division resource science courses and two upper division social science/humanities courses in consultation with adviser; minimum 12 units.	

### **Areas of Specialization (choose one)**

No course may be used to satisfy more than one requirement.

### **Floriculture/Nursery Option .....18**

Environmental Horticulture 120, 125 .....	8
Applied Biological Systems Technology 165 .....	2
Entomology 135 .....	4
Plant Sciences 100C or 158 or Soil Science 109 .....	4

### **Plant Biodiversity/Restoration Option .....16-22**

Environmental Horticulture 160, 160L .....	4
Environmental Horticulture 150, or Evolution and Ecology 100, or Plant Biology 116 .....	3-5
(a) Select one course from: Environmental Science and Management 141, Environmental Science and Policy 127, 155L, Plant Sciences 130, 150, Wildlife, Fish, and Conservation Biology 155 .....	3-4
(b) Select one course from: Environmental Science and Policy 155, Plant Biology 108, 117, 119, Plant Sciences 102, 144, 147/	

### **147L, 163, 176, Wildlife, Fish, and Conservation Biology 156, 157 .....**

3-5  
Select one additional class from section a or b .....

### **Urban Landscape Management Option .....16-17**

Environmental Horticulture 100, 133 .....	8
Applied Biological Systems Technology 165 .....	2
Plant Sciences 162 .....	3
Science and Society 18 or Landscape Architecture 150 .....	3-4

### **Total Units for the Major.....114-130**

**Major Adviser.** T.P. Young

**Advising Center** for the major is located in 1224 Plant and Environmental Sciences 530-752-7738.

## **Environmental Policy Analysis and Planning**

(College of Agricultural and Environmental Sciences)

### **The Major Program**

The major in environmental policy analysis and planning develops skills for designing and assessing sustainable policies for environmental quality and natural resource management.

Any student in good standing is eligible to transfer to the major; to do so, please see the staff adviser, Melissa Whaley, in 2134 Wickson Hall, or the master adviser, Prof. J. Sanchirico, in 2102 Wickson Hall.

**The Program.** This major provides students with a strong background in policy analysis, including the evaluation of policy alternatives and the study of factors affecting policy formulation and implementation. Key components of this interdisciplinary training include general background in the natural sciences relevant to environmental policy, economics, political science, statistics, and research methodology to quantitatively analyze environmental problems and policy options. In addition, students are encouraged to develop substantive knowledge in a specific field of environmental policy, such as urban and regional planning, water policy, transportation and energy, climate policy, or conservation management.

**Careers.** Environmental policy analysis and planning graduates are prepared for employment in environmental, natural resource, energy, and transportation focused public agencies, consulting firms, non-governmental organizations, and businesses, or as legislative aides for elected representatives. The major is also excellent preparation for students who want to go on to graduate work in law, planning, public policy, political science, economics, or business.

### **B.S. Major Requirements:**

UNITS

### **English Composition and Public Speaking Requirement .....3-8**

University Writing Program 101, 102A-G, 104A-E, or passing the Upper Division English Composition exam .....	0-4
Communication 1 or 3 or Dramatic Art 10 .....	3-4

### **Preparatory Subject Matter .....46-52**

Biological Sciences 2A, 10, or 10V, Chemistry 2A or 10, and Physics 1A .....	11-13
Biological Sciences 2B or Chemistry 2B or Physics 1B .....	3-5
Plant Sciences 21, or Science & Society 18 .....	3
Economics 1A, 1B .....	8
Animal Science 1, Atmospheric Science 60, Environmental Science & Management 100, Geology 1 or 134, Plant Sciences 12, or Wildlife, Fish, & Conservation Biology 11 .....	3-5

**Fall 2011 and on Revised General Education (GE): AH=Arts and Humanities; SE=Science and Engineering; SS=Social Sciences; OL=Oral Skills; QL=Quantitative; SL=Scientific; VL=Visual; WC=World Cultures; WE=Writing Experience**

**ACGH=American Cultures; DD=Domestic Diversity; ArHum=Arts and Humanities; SciEng=Science and Engineering; SocSci=Social Sciences; Div=Domestic Diversity; Wrt=Writing Experience**

**Pre-Fall 2011 General Education (GE): ArtHum=Arts and Humanities; SciEng=Science and Engineering; SocSci=Social Sciences; Div=Domestic Diversity; Wrt=Writing Experience**

**Quarter Offered: F=Fall, W=Winter, S=Spring, Su=Summer; 2017-2018 offering in parentheses**

Environmental Science & Policy 1 .....	4
Mathematics 16A-16B, 17A-17B, or 21A-21B .....	6-8
Political Science 1 .....	4
Statistics 13 or 32 .....	3-4

Satisfaction of General Education requirement.

#### Depth Subject Matter ..... 49-51

(Students must take these units on a letter grade basis, and must attain an overall grade point average of 2.000 or higher in the Depth Subject Matter courses.)

Environmental Science & Policy 110, 160, 168A, 168B .....	17
Environmental Science & Policy 161 .....	4
Environmental Science & Policy 178 .....	4
Environmental Science & Policy 179 .....	4
Select one course from: Agricultural & Resource Economics 106, Sociology 106, Statistics 100, 103, or 108 .....	4-5
Agricultural & Resource Economics 100A or Economics 100 .....	4
Agricultural & Resource Economics 176, Economics 125, or Environmental Science & Policy 175 .....	4
Applied Biological Systems Technology 150 .....	4
Select one course from: Applied Biological Systems Technology 181N, 182, or Environmental Science & Management 185 or 186 .....	4-5

#### Areas of Specialization (choose one) ..... 12-17

Students must select courses in the Areas of Specialization that have not been taken in the Depth Subject Matter.

#### City & Regional Planning

Environmental Science & Policy 171 and 172 .....	8
Select one course from: Civil & Environmental Engineering 162, 165 or Environmental Science & Policy 163 .....	3-4
Select one course from: Art History 168, Community & Regional Development 149, 152, 156, or 171, Environmental Toxicology 110, Environmental Science & Policy 173 or Political Science 100 .....	2-5

#### Climate Change Policy

Environmental Science & Policy 165N .....	3
Select one course from: Agriculture & Resource Economics 176, Economics 125, Environmental Science & Policy 163, 167, or 171 .....	4
Select two courses from: Atmospheric Science 116, 133, or 160, Environmental Science & Management 131, Environmental Science & Policy 116N, Science & Society 25 or 25V .....	6-8

#### Conservation Management

Select two courses from: Environmental Science & Policy 166N, 169, 170, or 172 .....	6-8
Select one course from: Environmental Horticulture 160, Environmental Science & Management 141, Environmental Science & Policy 100, 121, or 127, Evolution & Ecology 115, 138, or Wildlife, Fish, & Conservation Biology 154 or 155 .....	3-5
Select one course from: African American & African Studies 176, 177, Agriculture & Resource Economics 115A, Anthropology 103, Asian American Studies 114, Chicana/Chicano Studies 112, Community & Regional Development 153A, 153B, or 153C, International Relations 104, or Sociology 145A .....	4

#### Energy & Transportation Planning

Economics 125, Engineering 106, or Environmental Science & Policy 175.....	3-4
Select two courses from: Civil & Environmental Engineering 162, 165, Environmental Science & Policy 163, 167, or 172 .....	7-8

Select one course from: Atmospheric Science 116, Civil & Environmental Engineering 123, 143, Engineering 160, Environmental Science & Management 131, or Geology 130.....	3-4
---	-----

#### Environmental Policy & Politics

Select one course from: Political Science 100, 104, 105, 107, or 109 .....	4
Select one course from: Political Science 162, 164, 165, or 170 .....	4
Select one course from: Civil & Environmental Engineering 165, Environmental Science & Policy 165N, 166N, 167, 169, 170, 171, 172 .....	3-4
Select one course from: Agricultural & Resource Economics 106, 176, Civil & Environmental Engineering 153, Economics 130, or Environmental Science & Policy 175.....	4

#### Integrative Policy

Students choosing this individualized track must consult with a faculty adviser to identify an area of emphasis within this track and to select four upper division courses with a common theme. Possible areas of emphasis are marine policy, pollutants in the environment, planning in the presence of environmental hazards, sustainable development, or environmental and natural resource economics. If you are considering this track, please contact the major adviser as soon as possible.

#### Water Management

Select two courses from: Environmental Science & Policy 166N, 169, or Hydrologic Science 150 .....	6
Select two courses from: Environmental Science & Management 100, 121, Environmental Science & Policy 151, 155, Geology 134, Hydrologic Science 141, 143, Soil Science 118, Wildlife, Fish, & Conservation Biology 120, Biological Sciences 124, Environmental Science & Policy 116N, 124, 150C, or 152 .....	6-8

#### Total Units for the Degree ..... 110-128

**Major Adviser.** J. Sanchirico (*Environmental Science and Policy*)

#### Minor Program Requirements:

The faculty for environmental policy analysis and planning offers the following minor. The Environmental Policy Analysis minor is for natural and social science students desiring basic training in policy analysis theory and methods.

#### UNITS

#### Environmental Policy Analysis ..... 23-25

<i>Preparation:</i> Economics 1A; basic course in political science.	
Environmental Science & Policy 1 .....	4
Environmental Science & Policy 160, 161, 168A .....	13
Select two courses from: Environmental Science & Policy 163, 165N, 166N, 167, 168B, 169, 171, 172, or 179 .....	6-8

**Minor Adviser.** J. Sanchirico (*Environmental Science and Policy*)

## Environmental Science and Management

(College of Agricultural and Environmental Sciences)

#### The Major Program

The Environmental Science and Management (ESM) major is designed for students who are interested in solving environmental problems from an interdisciplinary perspective linking the natural and social sciences.

Students who choose this major will study the interaction of physical, biological, and social components of environmental problems. Students completing the program will understand the scientific basis for environmental decision making and the legal, economic, and political issues involved in management of the environment.

**The Program.** Courses in biology, chemistry, physics, economics, geology, and calculus form the lower-division preparatory foundation of the curriculum. These are then tied together with Environmental Science and Policy 1, "Environmental Analysis" which provides an inter-disciplinary analysis of several environmental problems. The upper-division core consists of foundation courses in physical, biological, and social sciences, as well as applied courses in environmental monitoring, GIS, impact reporting, and statistical analysis. In their junior year, students must choose a specialized track from the following six options:

- (a) Ecology, Biodiversity, and Conservation
- (b) Natural Resource Management
- (c) Climate Change and Air Quality
- (d) Geospatial Information Science
- (e) Watershed Science
- (f) Soils and Biogeochemistry

A capstone course is required for all seniors and serves to integrate the science, policy/management and biology aspects of the ESM major. All students gain practical experience through field courses and a required internship. Selected students may also pursue an honors thesis in their senior year.

The ESM major is jointly administered by the Departments of Environmental Science and Policy (ESP) and Land, Air and Water Resources (LAWR). Any student in good standing is eligible to transfer to the major; to do so, please see the student affairs officers in 2134 Wickson Hall or in 1150 Plant and Environmental Sciences Building.

**Careers.** Graduates from this program are prepared to pursue careers as practicing environmental scientists, resource analysts and planners working for public agencies and private firms specializing in environmental quality, natural resources or ecological research. The major is also an excellent preparation for graduate or professional training in physical and/or biological environmental science graduate programs, as well as in environmental law, administration and environmental policy.

#### B.S. Major Requirements:

#### UNITS

#### English Composition and Public Speaking requirement ..... 3-8

University Writing Program 101, 102A-G, 104A-E, or passing the Upper Division English Composition exam .....	0-4
Communication 1, 3, or Dramatic Art 10 .....	3-4

#### Preparatory Subject Matter ..... 48-57

Biological Sciences 2A, 2B, 2C .....	15
Geology 1 or 50; (Geology 50 recommended) .....	3-4
Chemistry 2A, 2B or 2AH, 2BH; (Chemistry 2C or 2CH recommended) .....	10
Physics 1A, 1B, or 7A, 7B, 7C .....	6-12
Economics 1A .....	4
Mathematics 16A, 16B, 17A, 17B, or 21A, 21B (Mathematics 17A, 17B recommended) .....	6-8
Environmental Science and Policy 1 .....	4
Satisfaction of the General Education requirement.	

#### Depth Subject Matter ..... 28-32

Environmental Science and Management 120 .....	4
Environmental Science and Policy 100 or Evolution and Ecology 101 .....	4
Environmental Science and Policy 162 .....	4
Statistics 13 or 100; (Statistics 100 recommended) .....	4

Select one course from: Environmental Science and Management 108 or Environmental Science and Policy 179 .. 3-4	
Applied Biological Systems Technology 150.....4	
Internship-Environmental Science and Management or Environmental Science and Policy 192 ..... 3	
Capstone Class-Environmental Science and Management 195 ..... 2	
Honors Thesis (optional)-Environmental Science and Management 194H ..... 0-3	
<b>Ecology, Biodiversity and Conservation Track .....</b>	<b>36-46</b>
Select one course from: Atmospheric Science 60, 116, 133, Environmental Science and Management 121, 131, Environmental Science and Policy 152, Geology 134, or Soil Science 100..... 3-5	
Select one course from: Environmental Science and Policy 170, 171, 172, 179, or Sociology 160..... 4	
Evolution and Ecology 100 ..... 4	
Select one course from: Environmental Science and Policy 127 or Wildlife, Fish, and Conservation Biology 154 ..... 4	
Select one course from: Environmental Horticulture 160 and 160L, Environmental Science and Policy 123, 124, Evolution and Ecology 180A, Plant Sciences 147 and 147L, or Wildlife, Fish, and Conservation Biology 100..... 3-4	
Select one course from: Environmental Science and Policy 121 or Wildlife, Fish, and Conservation Biology 122 ..... 4	
Evolution and Ecology 104, 115, 181, Environmental Science and Policy 151, 155, Plant Biology 117 or Wildlife, Fish, and Conservation Biology 155 ..... 3-4	
Select one course from: Evolution and Ecology 147 or Plant Sciences 162 or Environmental Horticulture 160..... 3-4	
Select one biome level course on wetlands, forests, or water from: Environmental Science and Management 144, Environmental Science and Policy 124, 150C, 151, 155, Evolution and Ecology 115, 138, Plant Sciences 130..... 3-5	
Select one organismal biology course on birds, mammals, or plants from: Entomology 103, 116, Evolution and Ecology 112, 114, 134, Plant Biology 102*, 116*, 119*, Wildlife, Fish, and Conservation Biology 110, 111, 120, 134; *these are combined lecture/lab courses and will fulfill both the organismal lecture and lab requirements simultaneously..... 3-5	
Complete one lab associated with either the biome level or organismal biology course (Entomology 116L, Environmental Science and Policy 151L, 155L, Evolution and Ecology 112L, 180B, Wildlife, Fish, and Conservation Biology 110L, 111L, 120L, 134L)..... 2-3	

<b>Natural Resource Management Track .....</b>	<b>32-41</b>
Select three courses from: Environmental Science and Policy 160, 165N, 166N, 167, 168A, 169, 171, 172, 179, or Sociology 160..... 9-13	
Select one course from: Environmental Science and Policy 161 or Hydrologic Science 150 ..... 3-4	
Statistics 103 (or equivalent upper-division statistics) ..... 4	
Select two courses from: Entomology 104, Environmental Science and Management 141, 144, Environmental Science and Policy 151, 155, Evolution and Ecology 115, Plant Biology 117, Plant Sciences 130 or Wildlife, Fish, and Conservation Biology 110, 111, 120, or 134..... 6-8	
Select two courses from: Atmospheric Science 116, Environmental Science and	

Management 121, 131 or Soil Science 100..... 6-9	
Environmental Science and Management 185 or 186 ..... 4	
<b>Climate Change and Air Quality Track .....</b>	<b>32-41</b>
Atmospheric Science 60 ..... 4	
Select three courses from: Atmospheric Science 115, 116, 133, 160, Environmental Science and Management 131 or Geology 108..... 9-12	
Select two courses from: Environmental Science and Management 100, 121, Environmental Science and Policy 116N, Hydrologic Science 143 or Soil Science 100..... 6-9	
Select one course from: Environmental Science and Management 144, Environmental Science and Policy 124, 150C, 151, 155, Evolution and Ecology 115 or Plant Sciences 130..... 3-4	
Select one course from: Evolution and Ecology 147 or 149 ..... 4	
Select two courses from: Environmental Science and Policy 163, 165N, 166N, 167, 171, 172, 179, or Sociology 160 ..... 6-8	
<b>Geospatial Information Science Track .....</b>	<b>33-42</b>
Select two courses from: Applied Biological Systems Technology 181N, 182, Environmental Science and Management 185, or 186..... 8-9	
Select two courses from: Environmental Science and Policy 163, 165N, 166N, 169, 171, 172, 179, or Sociology 160 ..... 6-8	
Select two courses from: Environmental Science and Policy 121, Statistics 104, 106, 108, 130A, 130B or 137..... 8	
Other applicable information technology courses from the Engineering department including database management, digital library science and network and Web technologies may be substituted for spatial information with approval.	
Select three courses from the following options. Must cover both physical and biological courses from Atmospheric Science 110, 116, 133, Soil Science 100, Environmental Science and Policy 124, 150C, 151, 152, 155, Geology 136, Plant Sciences 101 or Plant Biology 117 ..... 9-14	
<b>Soils and Biogeochemistry .....</b>	<b>38-46</b>
Soil Science 100..... 5	
Select four courses from: Environmental Science and Management 100, Hydrologic Science 134, Soil Science 102, 105, 107, 109, 111, or 120..... 16-21	
Select two courses from: Environmental Science and Management 121, Environmental Science and Policy 165N, 166N, 171, 172, 179, or Sociology 160 ..... 6-8	
Select one course from: Environmental Science and Management 185, Geology 134, Hydrologic Science 147, or Soil Science 118..... 3-4	
Select two courses from: Atmospheric Science 160, Environmental Science and Management 144, Environmental Science and Policy 116N, 150A, 150C, 151, 155, Geology 132, Plant Biology 117 or Plant Sciences 130 ..... 6-8	
<b>Watershed Science Track.....</b>	<b>38-47</b>
Environmental Science and Management 121 or Hydrologic Science 10 ..... 3	
Soil Science 100..... 5	
Select two courses from: Environmental Science and Management 100 or Hydrologic Science 141 (but not both), Hydrologic Science 142, 143, Environmental Science and Management 108 or Hydrologic Science 151 (but not both)..... 6-8	
Select one course from: Geology 35, 136, 139, or 140..... 3-5	

Select one course from: Applied Biological Systems Technology 181N or 182 ..... 4	
Select one course from: Soil Science 105, 118, or 120 ..... 4-5	
Select two courses from: Environmental Science and Policy 166N, 168A, 169, 172, 179, Hydrologic Science 150, or Landscape Architecture 60 ..... 6-9	
Atmospheric Science 133 ..... 4	
Select one course from: Entomology 116, Evolution and Ecology 115, or Wildlife, Fish, and Conservation Biology 120 or 134 .. 3-4	

### Total Units for the Major..... 111-114

**Major Advisers.** Marcel Holyoak (*Environmental Science and Policy*) and Terrance Nathan (*Land, Air and Water Resources*)

**Advising centers** for the major, including peer advising, are located in both the Environmental Science and Policy and Land, Air and Water Resources departments.

Students whose last names begin with the letters A-L, please see Melissa Whaley in 2134 Wickson Hall.

Students whose last names begin with the letters M-Z, please see Lacole Brooks in 1150 Plant and Environmental Sciences.

## Courses in Environmental Science and Management (ESM)

### Lower Division

#### 8. Water Quality at Risk (3)

Lecture—2 hours; discussion—1 hour. Natural and human threats to water quality. Balance of science and policy in all aspects of attaining, maintaining, and managing water quality, water contamination. Decoding popular media coverage of water quality and water contamination. (Same course as Science and Society 8.) Not open to students who have successfully completed Environmental and Resource Sciences 8. (Formerly Environmental and Resource Sciences 8.) GE credit: SciEng or SocSci, Wrt | SE, SL, SS, WE. —W. (W.) Hernes

#### 30. World Ecosystems & Geography (3)

Lecture—3 hours. Introduction to the earth's major geographic regions and associated ecosystems, such as deserts, temperate forests, and oceans with an examination of how climate, vegetation regimes, ecological processes, agriculture and other human activities interact in different regions of the world. (Same course as Environmental Science and Policy 30.) Not open to students who have successfully completed Environmental and Resource Sciences 30. (Formerly Environmental and Resource Sciences 30.) Offered alternate years. GE credit: SciEng | SE, SL, WC. —W. (W.) Jackson

#### 47. Watershed Processes and Water Quality in the Tahoe Basin (2)

Lecture/laboratory—21 hours; fieldwork—9 hours; discussion—3 hours; term paper. Prerequisite: basic knowledge of environmental, soil, or hydrologic sciences. Watershed processes, runoff water-quality management, restoration in Lake Tahoe Basin. Soils, precipitation-runoff, revegetation and adaptive management related to erosion control, effective solutions, development of restoration strategies. Students develop field restoration. Course involves 3 days of instruction in Tahoe City. (Same course as Hydrologic Science 47.) Not open to students who have successfully completed Environmental and Resource Sciences 47. (Formerly Environmental and Resource Sciences 47.) GE credit: SciEng | QL, SE, SL, WC. —W. (W.) Jackson

#### 92. Internship (1-12)

Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in resource sciences. Internship supervised by a member of the faculty. (P/NP grading only.) May be repeated for credit.—F, W, S. (F, W, S.)

#### 98. Directed Group Study (1-5)

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

**98F. Student Facilitated Course Development (1-3)**

Prerequisite: consent of instructor. Restricted to upper division standing or consent of instructor. Student-facilitated (taught) course intended for lower division students. Offered irregularly. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor. Primarily for lower division students. May be repeated for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

**Upper Division****100. Principles of Hydrologic Science (4)**

Lecture—4 hours. Prerequisite: Chemistry 2B, Mathematics 16B, and Physics 7A or 9A. Topics include hydrology (surface and ground water), hydraulic flow through porous media, water in the soil-plant-atmosphere continuum, water quality, flow through open channels, and representative water-resource problems. Not open to students who have successfully completed Environmental and Resource Sciences 100. (Formerly Environmental and Resource Sciences 100.) GE credit: SciEng | QL, SE, SL.—F. (F.) Grismer

**108. Environmental Monitoring (3)**

Lecture/discussion—2 hours; laboratory—2 hours; fieldwork. Prerequisite: entry level course work in student's major; specifically, Evolution and Ecology 101 (Evolution and Ecology), Environmental Science and Policy 100 (Environmental Biology and Management), Environmental Toxicology 101 (Environmental Toxicology), Wildlife, Fish, and Conservation Biology 100 (Wildlife, Fish, and Conservation Biology), Environmental and Resource Sciences 100 (Hydrologic Science), Soil Science 100 (Soil Science), Environmental Horticulture 100 (Environmental Horticulture and Urban Forestry), Landscape Architecture 50 (Landscape Architecture) or the equivalent for any of these courses. Instrumentation and methods for environmental and ecological monitoring; GPS, sensors, datalogging, and GIS. Wide range of measurement techniques for environmental parameters. Not open to students who have successfully completed Environmental and Resource Sciences 108. (Formerly Environmental and Resource Sciences 108.) GE credit: SciEng | SE, SL.—S. (S.)

**120. Global Environmental Interactions (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: one college level chemistry course; one college level biology course. Limited to 25 students per discussion section. Relationships among climate, hydrology, biogeochemical cycles, soils and vegetation distribution in diverse landscapes and biomes. Emphasis on physical, chemical, and biological processes affecting ecosystems from the poles to the equator, and human impacts on the environment. Not open to students who have successfully completed Environmental Resources Sciences 60 or 120. (Formerly Environmental Resources Sciences 60 and 120.)—W. (W.) Houlton

**121. Water Science and Management (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: Physics 10 or Geology 1. Role of water as an essential natural resource in contemporary society. Aspects of the scientific method, including descriptions of natural phenomena and underlying physical causes. Water for cities, agriculture, industry, wildlife and recreation; case studies of water management. Not open to students who have successfully completed Environmental and Resource Sciences 121. (Formerly Environmental and Resource Sciences 121.) GE credit: SciEng | QL, SE, SL.—F. (F.) Sandoval Solis

**131. Air as a Resource (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: Chemistry 10. Degradation of the atmospheric resource, historical aspects and effects of air pollution examined. Evaluation of primary gaseous and particulate pollutants and discussion of their impact. Not open to students who have successfully completed Environmental and Resource Sciences 131. (Formerly Environmental and Resource Sciences 131.) GE credit: QL, SE, SL.—W. (W.) Zhang

**141. Role of Fire in Natural Ecosystems (4)**

Lecture—3 hours; term paper. Prerequisite: basic biological concepts: Biological Sciences 2A or Plant Sciences 2; ecology/evolution: Biological Sciences 2B or 2C. Fire regimes and roles in major North American vegetation types, especially in the west. Physics of fire, fire effects on organisms and ecosystem functioning, reconstructing fire histories, fire in resource management, and fire use by indigenous people. Not open to students who have successfully completed Environmental and Resource Sciences 141. (Formerly Environmental and Resource Sciences 141.) GE credit: SciEng | SE, SL, WE.—W. (W.) Latimer

**144. Trees and Forests (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Sciences 2 or Biological Sciences 1C or 2C. Biological structure and function of trees as organisms; understanding of forests as communities and as ecosystems; use of forests by humans; tree phenology, photosynthesis, respiration, soil processes, life histories, dormancy, forest biodiversity, and agroforestry. (Same course as Plant Sciences 144.) Not open for credit to students who have completed Plant Biology 144 or Environmental Horticulture 144 or Environmental and Resource Science 144. (Former course Plant Biology/Environmental Horticulture/Environmental and Resource Science 144.) GE credit: SciEng | SE, VL.—F. (F.) Berry, Dahlgren, Rice

**185. Aerial Photo Interpretation and Remote Sensing (4)**

Lecture—2 hours; laboratory—4 hours. Prerequisite: upper division standing. Basics of remote sensing and photogrammetry, grids and map projections, aerial photo interpretation, sensors and platforms for aerial and space photography and non-photographic imaging systems, aerial thermography, microwave sensing, and introduction to remote sensing applications. Not open to students who have successfully completed Environmental Resource Science 185. (Formerly Environmental Resource Science 185.)—F. (F.) Jin

**186. Environmental Remote Sensing (5)**

Lecture—3 hours; laboratory—6 hours. Prerequisite: Mathematics 16B and Physics 7C or 9B; upper division standing; Landscape Architecture 150 recommended. Overview of satellite, airborne, and ground-based remote sensing, building on properties of electromagnetic radiation. Applications include hydrologic processes, weather and climate, ecology and land use, soils, geology, forestry, and agriculture. Computer based analysis and visualization of images and processing techniques. Not open to students who have successfully completed Hydrologic Science 186 or Environmental and Resource Sciences 186. (Formerly Hydrologic Science 186 and formerly Environmental and Resource Sciences 186.) GE credit: SciEng | QL, SE, VL.—W. (W.) Ustин

**192. Internship (1-12)**

Internship—3-36 hours. Prerequisite: completion of 84 units; consent of instructor. Work experience off and on campus in resource sciences. Internship supervised by a member of the faculty. (P/NP grading only.)—F, W, S. (F, W, S.)

**194H. Senior Honor Thesis (2-6)**

Independent study—2-6 hours. Prerequisite: senior standing, overall GPA of 3.50 or higher and consent of master adviser. Independent study, guided research on an environmentally related subject of special interest to the student. GE credit: SciEng | SE, WE.

**195. Integrating Environmental Science and Management (2)**

Lecture/discussion—2 hours. Prerequisite: senior status in Environmental Science and Management major or other environmental science major (e.g. Environmental Resource Science; Environmental Biology and Management; Environmental Toxicology; Environmental Policy Analysis and Planning, Wildlife, Fish, and Conservation Biology; Hydrologic Science); consent of instructor. Practical aspects of environmental improvement through integrated analyses of contemporary issues or problems associated

with advocacy, regulation, science and resource management from the perspectives of the physical and ecological sciences and current policy/management. May be repeated two times for credit. GE credit: SciEng or SocSci | SS or SE.—W. (W.) Grismer

**198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S. (F, W, S.)

**198F. Student Facilitated Course (1-3)**

Prerequisite: consent of instructor. Student-facilitated (taught) course intended for upper division students. Offered irregularly. (P/NP grading only.)—F, W, S. (F, W, S.)

**199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S. (F, W, S.)

**199FA. Student Teaching Course Development (1-3)**

Prerequisite: consent of instructor. Restricted to upper division standing. Under the supervision of a faculty member, an undergraduate student plans and develops the course they will teach under 98F/198F. Offered irregularly. (P/NP grading only.)

**199FB. Student Teaching Course Development (1-3)**

Prerequisite: course 199FA; consent of instructor. Restricted to upper division standing. Student facilitated. Under the supervision of a faculty member, an undergraduate student teaches a course under 98F/198F. Offered irregularly. (P/NP grading only.)

## Environmental Science and Policy

(College of Agricultural and Environmental Sciences)

Marcel Holyoak, Ph.D., Chairperson of the Department

Mark N. Lubell, Ph.D., Vice Chairperson

**Department Office.** 2132 Wickson Hall  
530-752-3026

**Faculty**

Gwendolyn B. Arnold, Ph.D., Assistant Professor

Marissa L. Baskett, Ph.D., Associate Professor

Edwin D. Grosholz, Ph.D., Professor, Specialist in Cooperative Extension

Susan L. Handy, Ph.D., Professor

Susan P. Harrison, Ph.D., Professor

Alan M. Hastings, Ph.D., Distinguished Professor

Robert Hijmans, Ph.D., Associate Professor

Marcel Holyoak, Ph.D., Professor

John L. Largier, Ph.D., Professor

C.Y. Cynthia Lin, Ph.D., Associate Professor  
*(Environmental Science and Policy, Agricultural and Resource Economics)*

Mark N. Lubell, Ph.D., Professor

Frances Moore, Ph.D., Assistant Professor

Steven G. Morgan, Ph.D., Professor

Joan M. Ogden, Ph.D., Professor

Eliska Rejmankova, Ph.D., Professor

Steven Sadro, Ph.D., Assistant Professor

James N. Sanchez, Ph.D., Professor

Mark W. Schwartz, Ph.D., Professor

*Academic Senate Distinguished Teaching Award*

Andrew Sih, Ph.D., Distinguished Professor

Daniel Sperling, Ph.D., Distinguished Professor  
*(Environmental Science and Policy, Civil and Environmental Engineering)*

Michael Springborn, Ph.D., Associate Professor

Thomas P. Tomich, Ph.D., Professor *(Environmental Science and Policy, Human and Community Development)*

**Emeriti Faculty**

Howard V. Cornell, Ph.D., Professor Emeritus

Charles R. Goldman, Ph.D., Professor Emeritus

*Distinguished Graduate Mentoring Award*

Robert A. Johnston, M.S., Professor Emeritus

**Fall 2011 and on Revised General Education (GE): AH=Arts and Humanities; SE=Science and Engineering; SS=Social Sciences;**

**ACGH=American Cultures; DD=Domestic Diversity; OL=Oral Skills; QL=Quantitative; SL=Scientific; VL=Visual; WC=World Cultures; WE=Writing Experience**

**Pre-Fall 2011 General Education (GE): ArtHum=Arts and Humanities; SciEng=Science and Engineering; SocSci=Social Sciences; Div=Domestic Diversity; Wrt=Writing Experience**  
**Quarter Offered:** F=Fall, W=Winter, S=Spring, Su=Summer; 2017-2018 offering in parentheses

Benjamin S. Orlove, Ph.D., Professor Emeritus  
 James F. Quinn, Ph.D., Professor Emeritus  
 Seymour I. Schwartz, Ph.D., Professor Emeritus  
 Academic Senate Distinguished Teaching Award  
 Peter J. Richerson, Ph.D., Professor Emeritus

## The Program of Study

Environmental Science and Policy is a teaching and research department offering courses, workshops, and directed group study classes that focus on the complex trade-offs that arise from interdependences between natural and human systems. The department offers Bachelor of Science degrees in Environmental Science and Management and in Environmental Policy Analysis and Planning. Courses in Environmental Science and Policy also supplement major programs in a wide variety of established disciplines.

**Current Information.** Through its continuing contacts with many other departments and teaching divisions on the campus, the department develops a variety of special courses and workshops each year. Check with the Department office for up-to-date information about our courses and workshops.

**Graduate Study.** The Graduate Group in Ecology which is housed in Environmental Science & Policy offers an M.S. and Ph.D. degree program. Further information about graduate programs in ecology should be obtained from the chairperson of the Graduate Group in Ecology.

**Group Office.** 1005 Wickson Hall 530) 752-6752; <http://ecology.ucdavis.edu/>

## Courses in Environmental Science and Policy (ESP)

### Lower Division

#### 1. Environmental Analysis (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: University Writing Program 1 or English 3 or equivalent; sophomore standing; Economics 1A and Biological Sciences 2B recommended. Analysis of the physical, biological, and social interactions which constitute environmental problems. Emphasis on analysis of environmental problems, the consequences of proposed solutions, and the interaction of environmental science and public policy in creating solutions. GE credit: SciEng or SocSci | SE or SS, SL.—F. (F.) Arnold, Holyoak

#### 10. Current Issues in the Environment (3)

Lecture—3 hours. Prerequisite: elementary biology recommended. The science behind environmental issues, and policies affecting our ability to solve domestic and international environmental problems. Resources, environmental quality, regulation, environmental perception and conservation. Integrative case studies. Not open for credit to students who have completed course 1. GE credit: SciEng | SE or SS, SL, WE.—W. (W.) Morgan

#### 30. World Ecosystems & Geography (3)

Lecture—3 hours. Introduction to the earth's major geographic regions and associated ecosystems, such as deserts, temperate forests, and oceans with an examination of how climate, vegetation regimes, ecological processes, agriculture and other human activities interact in different regions of the world. (Same course as Environmental Science and Management 30.) Not open to students who have successfully completed Environmental and Resource Sciences 30. (Formerly Environmental and Resource Sciences 30.) Offered in alternate years. GE credit: SciEng | SE, SL, WC.

#### 92. Internship (1-12)

Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in all subject areas offered in the College of Agricultural and Environmental Sciences. Internship supervised by member of the faculty. (P/ NP grading only.)

#### 98. Directed Group Study (1-5)

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

### Upper Division

#### 100. General Ecology (4)

Lecture—3 hours; discussion—1 hour. Prerequisites: Biological Sciences 2A, 2B, 2C, Mathematics 16A and 16B or 17A and 17B or 21A and 21B; Statistics 13 recommended. Theoretical and experimental analysis of the distribution, growth and regulation of species populations; predator-prey and competitive interactions; and the organization of natural communities. Application of evolutionary and ecological principles to selected environmental problems. GE credit: SciEng | SE, SL.—F. (F.) Harrison, Sih

#### 101. Ecology, Nature, and Society (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Anthropology 1 or 2 or course 30 or Evolution and Ecology 100 or Biological Sciences 101 recommended. Interdisciplinary study of diversity and change in human societies, using frameworks from anthropology, evolutionary ecology, history, archaeology, psychology, and other fields. Topics include population dynamics, subsistence transitions, family organization, disease, economics, warfare, politics, and resource conservation. (Same course as Anthropology 101.) Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WC, WE.—Bergerhoff-Mulder

#### 105. Evolution of Societies and Cultures (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Anthropology 1 or 2 or course 30 or Evolution and Ecology 100 or Biological Sciences 101 recommended. Interdisciplinary study of social and cultural evolution in humans. Culture as a system of inheritance, psychology of cultural learning, culture as an adaptive system, evolution of maladaptations, evolution of technology and institutions, evolutionary transitions in human history, coevolution of genetic and cultural variation. Only 2 units of credit to students who have completed course 101 or Anthropology 101 prior to fall 2004. (Same course as Anthropology 105.) Offered irregularly. GE credit: SocSci, Wrt | QL, SS, WC, WE.

#### (a) Environmental Science

#### 110. Principles of Environmental Science (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Physics 1A or 7A, Mathematics 16B or 21B, and Biological Sciences 1A. Application of physical and chemical principles, ecological concepts, and systems approach to policy analysis of atmospheric environments, freshwater and marine environments, land use, energy supplies and technology, and other resources. GE credit: SciEng | QL, SE, SL.—W. (W.) Langer

#### 111. Marine Environmental Issues (1)

Discussion—1 hour. Prerequisite: consent of instructor. Examination of critical environmental issues occurring in coastal waters including the effects of climate change, overfishing, and other human impacts. Through readings and group discussions, students will develop an integrative understanding of the oceanographic and ecological processes. May be repeated two times for credit when topics differ. (Same Course as Evolution and Ecology 111.) GE credit: SciEng | SE, SL.—S, Su. (S, Su.)

#### 116N. Oceanography (3)

Lecture—2 hours; laboratory—3 hours; field work. Prerequisite: Geology 1 or 2 or 16 or 50. Advanced oceanographic topics: Chemical, physical, geological, and biological processes; research methods and data analysis; marine resources, anthropogenic impacts, and climate change; integrated earth/ocean/atmosphere systems; weekly lab and one weekend field trip. Offered in alternate years. (Same course as Geology 116N.) GE credit: SciEng | SE, SL.—W. (W.) Hill

#### (b) Ecological Analysis

#### 121. Population Ecology (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 2A, 2B, 2C, Mathematics 16B or 17B or 21B or 21BH. Development of exponential and logistic growth models for plant and animal populations, analysis of age structure and genetic structure, analysis of competition and predator-prey

systems. Emphasis is on developing models and using them to make predictions and solve problems. GE credit: SciEng, Wrt | QL, SE, SL.—W. (W.) Baskeff, Hastings

#### 123. Introduction to Field and Laboratory Methods in Ecology (4)

Lecture—2 hours; laboratory—2 hours; fieldwork—4 hours. Prerequisite: course 100 or Evolution and Ecology 101 or the equivalent. Statistics 100 or the equivalent. Introduces students to methods used for collecting ecological data in field and laboratory situations. Methods used by population ecologists and community ecologists; emphasis on experimental design, scientific writing and data analysis. Offered in alternate years. GE credit: SciEng | SE, SL.—(S.) Grosholz

#### 124. Marine and Coastal Field Ecology (3)

Lecture—2 hours; discussion—1 hour; laboratory—3 hours; fieldwork—3 hours. Prerequisite: upper division standing or consent of instructor. Introductory animal biology (Biological Sciences 1B) recommended; residence at or near Bodega Marine Lab required. Enrollment restricted to application at <http://www.bml.ucdavis.edu>. Ecology of marine populations and communities living in diverse habitats along the California coast. Hands-on learning using scientific process and tools of the biological trade to address ecological questions arising during field trips. Critical thinking through discussing scientific literature. Offered irregularly. GE credit: SciEng | SE, SL.

#### 127. Plant Conservation Biology (4)

Lecture/discussion—3 hours; discussion—1 hour; term paper. Prerequisite: course 100 or Evolution and Ecology 101 or equivalent upper division general ecology. Principles governing the conservation of plant species and plant communities, including the roles of fire, exotic species, grazing, pollination, soils, and population genetics; analytic and practical techniques for plant conservation; and introduction to relevant legal, ethical, and policy issues. Offered irregularly. GE credit: SciEng | SE, SL.

#### (d) Aquatic Ecosystems Analysis

#### 150A. Physical and Chemical Oceanography (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Science and Policy 116N or Geology 116N; Physics 9B, Mathematics 21D, Chemistry 2C; consent of instructor. Physical and chemical properties of seawater, fluid dynamics, air-sea interaction, currents, waves, tides, mixing, major oceanic geo-chemical cycles. (Same course as Geology 150A.) GE credit: SciEng | QL, SE.—F. (F.) McClain, Spero

#### 150B. Geological Oceanography (3)

Lecture—3 hours. Prerequisite: Geology 50 or 116N or Geology 116N. Introduction to the origin and geologic evolution of ocean basins. Composition and structure of oceanic crust; marine volcanism; and deposition of marine sediments. Interpretation of geologic history of the ocean floor in terms of sea-floor spreading theory. (Same course as Geology 150B.) GE credit: SciEng | SE.—W. (W.) McClain

#### 150C. Biological Oceanography (4)

Lecture—3 hours; discussion—1 hour; fieldwork. Prerequisite: Biological Sciences 2A; a course in general ecology. Ecology of major marine habitats, including intertidal, shelf benthic, deep-sea and plankton communities. Existing knowledge and contemporary issues in research. Segment devoted to human use. (Same course as Geology 150C.) GE credit: SciEng | SE, SL.—Su. (Su.) Hill

#### 151. Limnology (4)

Lecture—3 hours; discussion—1 hour; special project. Prerequisite: Biological Sciences 1A and junior standing. The biology and productivity of inland waters with emphasis on the physical and chemical environment. GE credit: SciEng | SE.

**151L. Limnology Laboratory (3)**

Laboratory—6 hours; two weekend field trips. Prerequisite: course 151 (may be taken concurrently); junior, senior, or graduate standing. Limnological studies of lakes, streams, and reservoirs with interpretation of aquatic ecology. GE credit: SciEng | SE.

**152. Coastal Oceanography (3)**

Lecture—2 hours; discussion—1 hour; laboratory—3 hours; fieldwork—3 hours. Prerequisite: upper division standing or consent of the instructor; physics (Physics 9B), calculus (Mathematics 21B) and exposure to physical and chemical oceanography (Geology/Environmental Science and Policy 150A) are recommended; residence at or near Bodega Marine Laboratory required. Enrollment restricted to application at <http://www.bml.ucdavis.edu>. Oceanography of coastal waters, including bays, river plumes, nearshore and estuaries; focus on transport patterns, how they are forced and implications for ecological and environmental problems. Pertinent for students in oceanography, ecology, environmental engineering, geology and hydrology. GE credit: SciEng | SE, SL.—Su. (Su.) Largier

**155. Wetland Ecology (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 2A or equivalent; course 100 or Evolution and Ecology 101 recommended. Introduction to wetland ecology. The structure and function of major wetland types and principles that are common to wetlands and that distinguish them from terrestrial and aquatic ecosystems. GE credit: SciEng | SE.—F. (F.) Rejmankova

**155L. Wetland Ecology Laboratory (3)**

Lecture—1 hour; laboratory—6 hours; field-work—two 1-day weekend field trips. Prerequisite: course 155 required (may be taken concurrently). Modern and classic techniques in wetland field ecology. Emphasis on sampling procedures, vegetation analysis, laboratory analytical procedures, and examples of successful wetland restoration techniques. GE credit: SciEng | SE, SL.—Su. (Su.) Rejmankova

**(e) Environmental Policy Analysis****160. The Policy Process (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Political Science 1; Economics 1A and Statistics 13 recommended. Alternative models of public policy-making and application to case studies in the U.S. and California. GE credit: SocSci | SS.—S. (S.) Arnold

**161. Environmental Law (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing and one course in environmental science or political science recommended. Introduction for non-Law School students to some of the principal issues in environmental law and the judicial interpretation of some important environmental statutes, e.g., NEPA. GE credit: SocSci, Wrt | SS.—S. (S.)

**162. Environmental Policy (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A. Compares economic with socio-cultural approaches to understanding the causes of environmental problems and strategies for addressing them. Includes different approaches to the policy process, policy instruments, and environmental behavior. Applies these principles to several problems. GE credit: SocSci | SS.—W. (W.) Springborn

**163. Energy and Environmental Aspects of Transportation (4)**

Lecture—3 hours; extensive writing. Prerequisite: Economics 1A or Engineering 106. Engineering, economic, and systems planning concepts. Analysis and evaluation of energy, air quality and selected environmental attributes of transportation technologies. Strategies for reducing pollution and petroleum consumption in light of institutional and political constraints. Evaluation of vehicle emission models. (Same course as Civil and Environmental Engineering 163.) Offered in alternate years. GE credit: SciEng or SocSci, Wrt | SE or SS, SL, WE.—F. Sperling

**164. Ethical Issues in Environmental Policy (3)**

Lecture—3 hours. Prerequisite: courses 160, 168A; seniors only in Environmental Policy Analysis and Planning or by consent of instructor. Basic modes of ethical reasoning and criteria of distributive justice applied to selected topics in environmental policy-making. Offered irregularly. GE credit: SocSci | SS.

**165N. Climate Policy (3)**

Lecture/discussion—3 hours. Prerequisite: course 1 or Economics 1A or consent of instructor. Models, data and assumptions behind competing arguments regarding societal response to the prospect of climate change at the state, national and international level from economic, ethical and policy science perspectives.—S. (S.) Springborn

**166N. Ocean and Coastal Policy (3)**

Lecture—3 hours. Prerequisite: course 1 or consent of instructor. Limited enrollment. Overview of U.S. and International ocean and coastal policy, including energy, coastal land-use and water quality, protected areas and species. Offered in alternate years. GE credit: SocSci | SS.—(W.) Sanchirico

**167. Energy Policy (4)**

Lecture—4 hours; term paper. Prerequisite: Economics 1A and Mathematics 16B or 17B or 21B, or consent of instructor. Survey of primary energy resources (fossil, renewable, nuclear), energy conversion methods, future energy demand scenarios, and environmental impacts of energy. Overview of energy policy in the U.S. Analysis of policy alternatives for addressing energy-related environmental and national security issues. Offered in alternate years. GE credit: SocSci | SS.—S. (S.) Ogden

**168A. Methods of Environmental Policy Evaluation (5)**

Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: Statistics 13; Economics 100 or Agricultural and Resource Economics 100A; Mathematics 16B or 17B or 21B; course 1; upper division standing. Evaluation of alternatives for solution of complex environmental problems; impact analysis, benefit-cost analysis, distributional analysis, decision making under uncertainty, and multi-objective evaluation. GE credit: SocSci | SS.—F. (F.) Ogden

**168B. Methods of Environmental Policy Analysis (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 168A. Continuation of course 168A, with emphasis on examination of the literature for applications of research and evaluation techniques to problems of transportation, air and water pollution, land use, and energy policy. Students will apply the methods and concepts by means of a major project. GE credit: SocSci | SS.—S. (S.) Sanchirico

**169. Water Policy and Politics (3)**

Lecture—3 hours. Prerequisite: Economics 1A or Political Science 1 recommended. The governance of water, including issues of water pollution/quality and water supply. The politics of water decision-making and effectiveness of water policy. Broad focus on federal water policy, with case examples from nationally significant U.S. watersheds. Offered in alternate years. GE credit: SocSci | SS.—S. (S.) Lubell

**(f) Environmental Planning****170. Conservation Biology Policy (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: one course in environmental science (e.g., course 1), conservation (e.g., Wildlife, Fish, and Conservation Biology 11 or 154), or government (e.g., Political Science 1) recommended. Analysis of policies designed to conserve species and their habitats. Emphasis on how individual incentives affect the success of conservation policies. Valuation of endangered species and biodiversity. Criteria for deciding conservation priorities. Offered in alternate years. GE credit: SciEng or SocSci | SE or SS.—S. (S.) Schwartz

**171. Urban and Regional Planning (4)**

Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: course 1 recommended. How cities plan for growth in ways that minimize environmental harm. Standard city planning tools (general plan, zoning ordinance) and innovative new approaches. Focus on planning requirements and practices in California. Relationships between local, regional, state, and federal policy. GE credit: SocSci | SS, WE.—S. (S.) Handy

**172. Public Lands Management (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A recommended. Investigation of alternative approaches to public lands management by Federal and state agencies. The role each agency's legislation plays in determining the range of resource allocations. GE credit: SocSci | ACGH, SS.—F. (F.) Lubell

**173. Land Use and Growth Controls (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing; one course in environmental policy. Exposes students to the economic, political, and legal factors affecting land use and growth controls, and helps students critically evaluate written materials in terms of their arguments and supporting data. GE credit: SocSci | SS.—Su. (Su.) Loux

**175. Natural Resource Economics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural and Resource Economics 100B or Economics 100 or the equivalent. Economic concepts and policy issues associated with natural resources, renewable resources (ground water, forests, fisheries, and wildlife populations) and non-renewable resources (minerals and energy resources, soil). (Same course as Agricultural and Resource Economics 175.) GE credit: SocSci | SS.—S. (S.) Lin

**178. Applied Research Methods (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural & Resource Economics 106 or Sociology 106 or Statistics 100 or 103 or 108 or the equivalent. Research methods for analysis of urban and regional land use, transportation, and environmental problems. Survey research and other data collection techniques; demographic analysis; basic forecasting, air quality, and transportation models. Collection, interpretation, and critical evaluation of data. GE credit: SocSci | QL, SS.—W. (W.)

**179. Environmental Impact Assessment (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or the equivalent. Introduction to the information resources and methods typically used in environmental impact analysis. Emphasis on how environmental information is applied to planning, environmental regulation, and public policymaking, with case studies from California land use and natural resource policy. GE credit: SocSci | SS.—W. (W.)

**179L. Environmental Impact Reporting Using Geographic Information (2)**

Laboratory/discussion—2 hours; laboratory—4 hours. Prerequisite: course 179 concurrently. Introduction to Geographic Information Systems (GIS) by using ArcView for assessment and environmental planning. Not open for credit to students who have completed Applied Biological Systems Technology 180, 181 or Agricultural Systems and Environment 132. GE credit: SciEng | SE.

**(g) Other Courses****190. Workshops on Environmental Problems (1-8)**

Laboratory—2-16 hours. Prerequisite: consent of instructor. Workshops featuring empirical analyses of contemporary environmental problems by multidisciplinary student teams. Guided by faculty and lay professionals, the teams seek to develop an integrated view of a problem and outline a series of alternative solutions. Open to all upper division and graduate students on application. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

### **191A. Workshop on Food System Sustainability (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: upper-division standing; Plant Sciences 15, Community and Regional Development 20, Agricultural and Resource Economics 121, Plant Sciences 150 or consent of the instructor. Priority enrollment for seniors in the sustainable agriculture and food systems major; limited to 25 students per section. First in a two-quarter senior capstone course sequence. Identify projects addressing specific problems and opportunities of sustainable agriculture and food systems, form multidisciplinary teams, and identify and consult with key stakeholders to understand their needs and concerns. GE credit: SciEng | SE.—F. (F.) Tomich

### **191B. Workshop on Food System Sustainability (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 191A. Priority enrollment for seniors in the sustainable agriculture and food systems major; limited to 25 students per section. Continuation of course 191A. Student teams conduct analyses of a specific issue in sustainable agriculture or food systems, prepare a critical assessment of technological, economic, environmental, and social dimensions of options for action and present their results to stakeholders. GE credit: SciEng | SE.—W. (W.) Tomich

### **192. Internship (1-12)**

Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in all subject areas offered in the College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (P/NP grading only.)—F, W, S. (F, W, S.)

### **197T. Tutoring in Environmental Science and Policy (1-5)**

Tutorial—2-6 hours. Prerequisite: upper division standing and consent of instructor. Experience in teaching under guidance of faculty member. (P/NP grading only.)—F, W, S. (F, W, S.)

### **198. Directed Group Study (1-5)**

(P/NP grading only.)—F, W, S. (F, W, S.)

### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S. (F, W, S.)

### **Graduate**

#### **212A. Environmental Policy Process (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course in public policy (e.g., Environmental Science and Policy 160); environmental law (e.g., Environmental Science and Policy 161); course in bureaucratic theory (e.g., Political Science 187 or Environmental Science and Policy 166); course in statistics (e.g., Sociology 106 or Agricultural and Resource Economics 106). Introduction to selected topics in the policy process, applications to the field of environmental policy. Develops critical reading skills, understanding of frameworks of the policy process and political behavior, and an ability to apply multiple frameworks to the same phenomena. Offered in alternate years. (Same course as Ecology 212A.)—S. Arnold

#### **212B. Environmental Policy Evaluation (4)**

Lecture—1 hour; discussion—1 hour; seminar—2 hours. Prerequisite: intermediate microeconomics (e.g., Economics 100); Statistics 108 or Agricultural and Resource Economics 106; policy analysis (e.g., Environmental Science and Policy 168A or the equivalent); Agricultural and Resource Economics 176. Methods and practices of policy analysis; philosophical and intellectual bases of policy analysis and the political role of policy analysis. (Same course as Ecology 212B.) Offered in alternate years.—(S) Springborn

#### **220. Tropical Ecology (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: advanced introductory ecology course—course 100, Evolution and Ecology 101, 117; Evolution and Ecology 138 recommended. Open to graduate and undergraduate students who meet requirement

subject to consent of instructor. An overview of present status of knowledge on structure and processes of major tropical ecosystems. Differences and similarities among tropical and temperate systems stressed. Offered in alternate years.—(S.) Rejmanova

#### **228. Advanced Simulation Modeling (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: courses 128-128L; Statistics 108 or Agricultural and Resource Economics 106. Advanced techniques in simulation modeling; optimization and simulation, dynamic parameter estimation, linear models, error propagation, and sensitivity testing. Latter half of course will introduce model evaluation in ecological and social system models.

#### **252. Sustainable Transportation Technology and Policy (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: course 160 or the equivalent. Role of technical fixes and demand management in creating a sustainable transportation system. Emphasis on technology options, including alternative fuels, electric propulsion, and IVHS. Analysis of market demand and travel behavior, environmental impacts, economics and politics. (Same course as Civil and Environmental Engineering 252.)—S. Sperling

#### **275. Economic Analysis of Resource and Environmental Policies (4)**

Lecture/discussion—4 hours. Prerequisite: Agricultural and Resource Economics 204/Economics 204. Development of externality theory, market failure concepts, welfare economics, theory of renewable and non-renewable resource use, and political economic models. Applications to policy issues regarding the agricultural/environment interface and managing resources in the public domain. (Same course as Agricultural and Resource Economics 275.)—S. (S.)

#### **278. Research Methods in Environmental Policy (3)**

Lecture/discussion—3 hours. Prerequisite: Agricultural and Resource Economics 106 or the equivalent. Introduction to scientific research in environmental policy. Major issues in the philosophy of the social sciences. How to design research that acknowledges theoretical assumptions and that is likely to produce evidence in an intersubjectively reliable fashion with explicit recognition of its uncertainties.

#### **298. Directed Group Study (1-5)**

#### **299. Research (1-12)**

Prerequisite: graduate standing. (S/U grading only.)

## **Environmental Sciences**

See **Atmospheric Science, on page 184; Environmental and Resource Sciences, on page 323; Environmental Horticulture and Urban Forestry, on page 324; Environmental Policy Analysis and Planning, on page 324; Environmental Toxicology, on page 330; Hydrology, on page 376; Landscape Architecture, on page 392; and Wildlife, Fish, and Conservation Biology, on page 587.**

## **Environmental Sciences**

# **Environmental Toxicology**

(College of Agricultural and Environmental Sciences)

Robert H. Rice, Ph.D., Chairperson of the Department

**Department Office.** 4138 Meyer Hall  
530-752-1142; <http://etox.ucdavis.edu>

### **Faculty**

Gary N. Cherr, Ph.D., Professor  
*(Environmental Toxicology, Nutrition)*

Michael S. Denison, Ph.D., Professor

Nilesh Gaikwad, Ph.D., Associate Professor

Michele La Merrill, Ph.D., M.P.H., Assistant Professor

Tran B. Nguyen, Assistant Professor

Patricia Oteiza, Ph.D., Professor  
*(Environmental Toxicology, Nutrition)*

Robert H. Rice, Ph.D., Professor

Takayuki Shibamoto, Ph.D., Distinguished Professor

Ronald S. Tjeerdema, Ph.D., Professor

Andrew Whitehead, Ph.D., Associate Professor

Matthew J. Wood, Ph.D., Associate Professor

Qi Zhang, Ph.D., Professor

### **Emeriti Faculty**

Arthur Craigmill, Ph.D., Specialist in Cooperative Extension, Emeritus

Donald G. Crosby, Ph.D., Professor Emeritus

Dennis P. H. Hsieh, Sc.D., Professor Emeritus

James N. Seiber, Ph.D., Professor Emeritus

Michael W. Stimmann, Ph.D., Specialist in Cooperative Extension, Emeritus

Dorothy E. Woolley, Ph.D., Professor Emeritus

### **Affiliated Faculty**

Beck, John, Ph.D., Associate Adjunct Professor

Deborah Bennett, Ph.D., Associate Professor  
*(Public Health Sciences, School of Medicine)*

Cassandra Calloway, Ph.D., Assistant Adjunct Professor

Matt Hengel, Ph.D., Associate Adjunct Professor

Dirk Holstege, Ph.D., Associate Adjunct Professor

Norman Kado, Ph.D., Adjunct Professor

John Knezovich, Ph.D., Adjunct Professor

Charlie Li, Ph.D., Assistant Adjunct Professor

Melanie Marty, Ph.D., Associate Adjunct Professor

Alyon E. Mitchell, Ph.D., Professor  
*(Food Science and Technology)*

Karen Riveles, Ph.D., MPH, Assistant Adjunct Professor

Jeff Rodzen, Ph.D., Lecturer

*(UC Davis Extension Forensic Science Program)*

Cecilia Von Beroldingen, Ph.D., Lecturer

*(UC Davis Extension Forensic Science Program and Department of Justice)*

Zachary A. Wong, Ph.D., Adjunct Professor

### **The Major Program**

Toxic agents in the environment include pesticides, food additives, industrial waste, and metals as well as chemicals produced by animals, plants, fungi and bacteria. Students in the Environmental Toxicology major learn how toxicants produce adverse effects by understanding their environmental fates and biological activities. They learn about monitoring concentrations and the distribution and persistence of agents found in water, soil, air and foods. Toxicity testing procedures and exposure assessments are used to help evaluate potential for harm to humans and other species. By understanding the cellular targets and biochemical mechanisms of perturbation by toxicants, toxicologists can better estimate adverse effects. Overall, students learn mechanisms by which toxic agents act, their origin and fate and how toxicologists evaluate the risk of adverse effects and balance them against the benefits of us.

**The Program.** Preparatory courses in biology, chemistry, mathematics, and physics are required to provide fundamental principles that underlie toxicology. Students in the major are expected to understand the environmental fates and biological activities of different classes of toxic substances, and

the legislative issues that arise from chemical use. Opportunities are available to develop in-depth understanding in areas of emphasis through selection of electives.

**Emphases.** Elective course work in many disciplines can complement the required core courses. Providing a framework for selecting restricted electives, the major offers specializations in (1) Ecotoxicology and Environmental Chemistry, (2) Forensic Science and Regulatory Toxicology, and (3) Molecular and Biomedical Toxicology. The first category includes topics in chemical fate, transport and degradation, as well as ecology, wildlife, and aquatic toxicology. The second category includes forensic science, environmental policy and management, and public health. The third category includes pharmacology, biotechnology, medicine, veterinary medicine, and food toxicology. Students are encouraged to select course work from these Emphases and beyond to match their interests.

**Internships and Career Alternatives.** Occupations that use environmental toxicology include risk assessment, pharmaceutical development, food additive toxicity testing, managing regulatory compliance, residue or forensic analysis, pest control, monitoring and field sampling, industrial hygiene, and environmental health and safety. A substantial proportion of graduates elect to pursue advanced training in graduate or professional schools. Others with the B.S. degree have gone on to law, medical, pharmacy, or veterinary medical school, as well as to graduate programs in pharmacology, toxicology, agricultural and environmental chemistry, or public health. During undergraduate study, optional internships or research projects are recommended to provide training and work experience to help students pursue future goals.

### B.S. Major Requirements:

UNITS

#### Preparatory Subject Matter ..... 72-73

Biological Sciences 2A, 2B, 2C .....	14-15
Chemistry 2A-2B-2C or 2AH-2BH-2CH, and 118A-118B-118C or 128A-128B-128C, 129A.....	26-27
Mathematics 17A-17B-17C or 21A-21B-21C .....	12
Physics 7A-7B-7C .....	12
Statistics 100, 102, 103, 104, 106, or 108 .....	4
Upper Division Writing; University Writing Program 101 or 104 (AI) .....	4

Preferably, the course should be taken prior to enrollment in Environmental Toxicology 102B and 103B.

Satisfaction of the General Education requirement to include courses selected with adviser's approval to complement the major; courses in agricultural economics, environmental studies, political science, psychology, and sociology are particularly recommended.

#### Depth Subject Matter ..... 37-47

Biological Sciences 101 and 102 or 102 and 103 .....	6-7
Environmental Toxicology 101, 102A-102B, 103A-103B and three upper division Environmental Toxicology classes chosen from the following list: 104, 120, 127, 128, 130, 131, 135, 138, and 146 .....	31-40

#### Restricted Electives ..... 24-26

Electives selected for area of Emphasis with faculty adviser's approval with 6 unit combined maximum of 190, 192, 198, and 199 with adviser approval; see department website for details.

#### Total Units for the Major ..... 133-146

**Major Adviser.** Matthew Wood

**Advising Center** for the major is in 4111 Meyer Hall. Contact the Academic Program Adviser at 530-752-1042.

### Minor Program Requirements:

UNITS

#### Environmental Toxicology ..... 18-26

Environmental Toxicology 101, 102A, 103A .....	12
Completion of two upper division Environmental Toxicology elective courses six units minimum, selected from the following list: Environmental Toxicology 104, 120, 127, 128, 130, 131, 135, 138, and 146 .....	6-14

**Minor Adviser.** Qi Zhang

**Graduate Study.** Programs of study leading to M.S. and Ph.D. degrees are available through related Graduate Groups such as Pharmacology and Toxicology; Biochemistry, Molecular, Cellular, and Developmental Biology; Agricultural and Environmental Chemistry; and the Forensic Science Master's Degree Program. For information on graduate study, contact the Advising Office or the appropriate graduate adviser.

### Courses in Environmental Toxicology (ETX)

#### Lower Division

##### 10. Introduction to Environmental Toxicology (3)

Lecture—3 hours. Hazardous substances, their effects on humans and their actions and movement in the environment. Emphasis on substances of current concern. GE credit: SciEng | SE, SL.—F. (F.) La Merrill, Tjeerdema

##### 20. Introduction to Forensic Science (3)

Lecture—3 hours. Basic principles of forensic science, types of information on which investigations focus, how information is obtained and used in criminal investigations, types of scientific skills required to practice forensic science, guidance on training. Real cases discussed; demonstrations of methods provided. GE credit: SciEng, Wrt | SE, SL, VL.—W. (W.) Wood

##### 30. Chemical and Drug Use and Abuse (3)

Lecture—3 hours. An overview of chemical use and abuse in our society. The effects of chemicals (therapeutic drugs, pesticides, food additives, herbal remedies, environmental contaminants, and recreational drugs) on humans and other living systems. GE credit: SciEng | SE.—S. (S.) Wood

##### 92. Internship (1-12)

Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in all subject areas offered in the College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (P/NP grading only.) GE credit: SE.

##### 99. Special Study for Undergraduates (1-5)

Prerequisite: consent of instructor. (P/NP grading only.) GE credit: SE.

#### Upper Division

##### 101. Principles of Environmental Toxicology (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 8B, 118B, or 128B and Biological Sciences 1A. Principles of toxicology with a focus on environmental, industrial, and natural chemicals. Topics include fate and effects of chemicals in organisms and the environment, air pollutants, insecticides, aquatic toxicology, endocrine disruptors, biomarkers and bioassays, and risk assessment. GE credit: SciEng | SE, SL.—F. (F.) Denison

##### 102A. Environmental Fate of Toxicants (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 8B, 118B, 128B or consent of instructor. Properties of toxic chemicals influencing their distribution and transformations; action of environmental forces affecting toxicant breakdown, movement, and accumulation; sources and occurrence of major classes of environmental toxicants. Not open for

credit to students who have completed course 112A. GE credit: SciEng | QL, SE, SL, VL, WE.—W. (W.) Tjeerdema

##### 102B. Quantitative Analysis of Environmental Toxicants (5)

Lecture—3 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 102A. Sample preparation methods for trace analysis of environmental toxicants. Concept and techniques of advanced analytical instrumentation. Interpretation and use of analytical data. Not open for credit to students who have completed course 112B. GE credit: SciEng | SE, VL.—S. (S.) Hengel, Shibamoto

##### 103A. Biological Effects of Toxicants (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 102; course 101 and Neurobiology, Physiology, and Behavior 101 recommended. Biological effects of toxic substances in living organisms. Metabolism, cellular and tissue targets, mechanisms of action, and pathological effects. Not open for credit to students who have completed course 114A. GE credit: SciEng | SE.—W. (W.) La Merrill

##### 103B. Biological Effects of Toxicants: Experimental Approaches (5)

Lecture—3 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 103A. Experimental approaches for assessing the biological effects of toxicants. Not open for credit to students who have completed course 114B. GE credit: SciEng | SE, VL, WE.—S. (S.) Wood

##### 104. Environmental and Nutritional Factors in Cellular Regulation and Nutritional Toxicants (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 101; Biological Sciences 103 or Animal Biology 103. Cellular regulation from nutritional/toxicological perspective. Emphasis: role of biofactors on modulation of signal transduction pathways, role of specific organelles in organization/regulation of metabolic transformations, major cofactor functions, principles of pharmacology/toxicology important to understanding nutrient/toxicant metabolism. (Same course as Nutrition 104.) GE credit: SciEng | OL, SE, SL.—F. (F.) Haj, Oteiza

##### 110. Toxic Tragedies and Their Impact on Society (2)

Lecture—2 hours. Prerequisite: Biological Sciences 10 or the equivalent or consent of instructor; Chemistry 118A recommended. Examination of toxic tragedies, their origins, consequences, and effects on toxic regulation. GE credit: SciEng, Wrt | OL, SE, SL, WE.—W. (W.) Rice

##### 111. Introduction to Mass Spectrometry (3)

Lecture—3 hours. Prerequisite: Chemistry 118C. Introduction to mass spectrometry, including ionization techniques, mass analyzers, interpretation of mass spectra, and applications of mass spectrometry. Emphasis on fundamental concepts of mass spectrometry necessary to identify and quantify organic molecules. GE credit: SciEng | SE.

##### 120. Perspectives in Aquatic Toxicology (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 8B, 118B or 128B, Biological Sciences 1A, or consent of instructor. Toxic substances, their fate in marine and freshwater systems, and their effects on aquatic organisms, populations, and ecosystems. Emphasis on substances and issues of current concern. Offered in alternate years. GE credit: SciEng | OL, SE, SL, VL, WE.—W. Cherr, Tjeerdema, Whitehead

##### 127. Environmental Stress and Development in Marine Organisms (10)

Lecture—4 hours; laboratory—12 hours; discussion—2 hours. Prerequisite: course 101 or Biological Sciences 102 or 104 or the equivalent; course 114A or Nutrition 114 recommended. Course taught at Bodega Marine Laboratory. Effects of environmental and nutritional stress, including pollutants, on development and function in embryos and larvae of marine organisms. Emphasis on advanced experimental methods. (Same course as Nutrition 127.) GE credit: SciEng | OL, QL, SE, SL, VL, WE.—S. Cherr

**128. Food Toxicology (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 102 and 103. Chemistry and biochemistry of toxins occurring in foods, including plant and animal toxins, intentional and unintentional food additives. The assessment of food safety and toxic hazards. (Same course as Food Science and Technology 128.) GE credit: SciEng | SE.—S. (S.) Gaikwad, Mitchell

**130. The Role and Applications of Toxicology in Modern Industry (3)**

Lecture—3 hours. Prerequisite: course 101 required; course 103A recommended. Role of toxicology in industry research and development, human health and environmental protection, hazard and risk evaluations, risk management and communications, product stewardship, and regulatory compliance. Scientific principles and methods of toxicology in chemical, energy, pharmaceutical, pesticide, biotechnology industries. GE credit: SciEng | OL, SE, SL, VL, WE.—F. (F.) Wong

**131. Environmental Toxicology of Air Pollutants (3)**

Lecture—3 hours. Prerequisite: Chemistry 8B (may be taken concurrently) or the equivalent; Biological Sciences 102 recommended. Field trip required. Toxicology of air pollutants in the ambient, indoor, and occupational environments. Health effects, sources, environmental fates, pulmonary responses, sampling and analyses, and air-quality criteria and standards. GE credit: SciEng | SE, VL.—F. (F.) Kado

**135. Health Risk Assessment of Toxicants (3)**

Lecture—3 hours. Prerequisite: course 101; course 114A recommended. Current practices of health risk assessment of environmental chemicals using toxicological principles and their application to regulatory control of these chemicals. GE credit: SciEng | QL, SE, SL, VL.—F. (F.) Marty

**138. Legal Aspects of Environmental Toxicology (3)**

Lecture—3 hours. Prerequisite: course 10 or 101 recommended. Federal and California legislation concerning air and water pollution, pesticide use, food and feed additives, consumer protection, and occupational exposure to toxic substances; roles of federal regulatory agencies; alternatives to government control. GE credit: SciEng | SE, VL, WE.—W. (W.) Riveles

**140. Genes and the Environment (3)**

Lecture/discussion—3 hours. Prerequisite: Biological Science 101 required or permission of instructor; coursework in genetics and molecular biology and/or environmental toxicology recommended. Evaluation of evidence that human health and disease susceptibility result from complex interactions between genes and the environment. Emphasis on cancer, metabolic, cardiovascular, and neurological health outcomes assessed by genotoxicity and toxicogenomic methods. Offered in alternate years.—F. (F.) La Merrill

**146. Exposure and Dose Assessment (3)**

Lecture—3 hours. Prerequisite: course 112A; course 135 recommended. The exposure component of risk assessment; specifically, the presence and/or formation of toxic substances in environmental media, their movement within and between contaminated media, and the contacts of human populations with those media. Offered in alternate years. GE credit: SciEng | QL, SE, SL, VL.—S. (S.) Bennett

**190. Seminar (1)**

Seminar—1 hour. Prerequisite: consent of instructor. Selected topics presented by students, faculty, or outside speakers covering current research and instructional activities within environmental toxicology. Reports and discussion concerning oral and written presentations, literature sources, and career opportunities. (P/NP grading only.) GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**190C. Research Group Conference (1)**

Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference of advanced research methods and the interpretation of research results. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

**190S. Environmental Toxicology Career Seminar (1)**

Seminar—1 hour. Careers in environmental toxicology; discussions with graduates from the Department of Environmental Toxicology and other experts in the field. (P/NP grading only.) GE credit: SE.—F. (F.)

**192. Internship (1-12)**

Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in all subject areas offered in the College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (P/NP grading only.) GE credit: SE.

**194HA. Honors Research (3)**

Discussion—1 hour; laboratory—6 hours. Prerequisite: senior standing; minimum GPA of 3.250; consent of instructor. Specific research project conducted under the supervision of a faculty sponsor. Experience to include experimental design, learning new techniques, data analysis and interpretation of findings. (P/NP grading only; deferred grading pending completion of sequence.) GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**194HB. Honors Research (3)**

Discussion—1 hour; laboratory—6 hours. Prerequisite: senior standing; minimum GPA of 3.250; consent of instructor. Specific research project conducted under the supervision of a faculty sponsor. Experience to include experimental design, learning new techniques, data analysis and interpretation of findings. (P/NP grading only; deferred grading pending completion of sequence.) GE credit: SE.—F, W, S. (F, W, S.)

**194HC. Honors Research (3)**

Laboratory—6-9 hours; discussion—1 hour. Prerequisite: senior standing; minimum GPA of 3.250; and consent of instructor. Continuation of course 194HA-194HB. (P/NP grading only.) GE credit: SE.

**197T. Tutoring in Environmental Toxicology (1-5)**

Hours and duties will vary depending upon course being tutored. Prerequisite: advanced standing in Environmental Toxicology, a related major, or the equivalent experience and consent of instructor. Teaching toxicology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated for credit up to a total of 5 units. (P/NP grading only.) GE credit: SE.

**198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) GE credit: SE.

**199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.) GE credit: SE.

**Graduate****203. Environmental Toxicants (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 128C (or the equivalent), or Chemistry 8B and consent of instructor. Toxic chemicals: selected topics illustrating their occurrence, structure, and the reactions underlying detection, toxicity, fate, and ecological importance. Offered in alternate years.—S. Beck, Seiber

**214. Mechanisms of Toxic Action (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 102, 103, and consent of instructor. Chemical, biochemical, and molecular mechanisms underlying the adverse effects of toxic chemicals. Students are required to write a grant proposal and participate in a grant review panel. Offered in alternate years.—S. Denison, Hammock

**220. Analysis of Toxicants (3)**

Lecture—3 hours. Prerequisite: coursework in organic chemistry. Principles of microanalysis of toxicants. Theoretical considerations regarding separation, detection and quantitative determination of toxicants using chemical and instrumental techniques. (Same course as Forensic Science 220.)—F. (F.) Zhang

**220L. Analysis of Toxicants Laboratory (2)**

Laboratory—6 hours. Prerequisite: course 220 (may be taken concurrently) and consent of instructor. Laboratory techniques for microanalysis of toxicants. Separation, detection, and quantitative determination of toxicants using chemical and instrumental methods.—F. (F.) Zhang

**228. Gas Chromatography/Mass Spectrometry of Toxic Chemicals (3)**

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: course 220 and Chemistry 129C; or consent of instructor. Application of GC/MS techniques to investigate toxic chemicals. Mass spectral fragmentations and their application to the structural elucidation. Practical application of GC/MS in current research. Preference given to environmental toxicology graduate students. Offered in alternate years.—(W.) Holstege

**234. Current Topics in Neurotoxicology (3)**

Lecture—3 hours. Prerequisite: core courses in one of the following graduate programs: Pharmacology and Toxicology, Agricultural and Environmental Chemistry, Biochemistry and Molecular Biology, Cell and Developmental Biology, Immunology, Molecular Cellular and Integrative Physiology or Neuroscience. Restricted to upper level undergraduate students must obtain permission from the course coordinator. General principles of neurotoxicology, the cell and molecular mechanisms and health impacts of specific neurotoxicants and the contribution of neurotoxic compounds to complex neurodevelopmental disorders and neurodegenerative diseases. (Same course as Molecular Biosciences 234 and Molecular, Cellular, and Integrative Physiology 234.)—S. (S.) Lein

**240. Ecotoxicology (3)**

Lecture—3 hours. Prerequisite: elementary course in toxicology and ecology or the equivalent, or consent of instructor. Principles of toxicology as applied to chemical action on natural populations, communities, and ecosystems. Physical, chemical, and biological characteristics which influence ecotoxic effects, modeling, and field research. Selected case histories are analyzed and presented in class.—S. (S.) Whitehead

**250. Reproductive Toxicology (3)**

Lecture—1.5 hours; lecture/discussion—1.5 hours. Prerequisite: Physiology 220 or Pharmacology—Toxicology 203. Application of toxicological principles in reproductive studies. Effects of toxicants on the male, female, and developing embryo/fetus. Critical evaluation of reproductive toxicity studies and development of mechanistic approaches to understanding how chemical exposure can adversely affect reproduction. Offered in alternate years.

**260. Immunotoxicology (3)**

Lecture—3 hours. Prerequisite: undergraduate or graduate introduction to immunology coursework recommended, but not required; graduate standing or consent of instructor. Provides students with skills and knowledge for evaluating and applying research on the impact of environmental toxicants on immunological function in human and wildlife populations. Offered in alternate years.

**270. Toxicology of Pesticides (3)**

Lecture—3 hours. Prerequisite: one course each in (a) Organic Chemistry, (b) Biochemistry, (c) Toxicology (course 101 or equivalent), or consent of instructor; graduate standing. Classification and chemical properties of pesticides, their mode of action, metabolism and disposition, pesticide resistance, effects on human health and ecological health and methods of risk benefit analyses. Offered in alternate years.

**278. Molecular Techniques (3)**

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Recombinant DNA technology and its applications. (Same course as Forensic Science 278.) Offered in alternate years.—(F.) Denison, Rice

**280. Forensic DNA Analysis (3)**

Lecture—3 hours. Prerequisite: coursework in genetics and molecular biology. Graduate standing; consent of instructor required for all students not enrolled

in the MS Forensics program. Foundation in theory and practice of forensic DNA analysis; past, present, and emerging technologies; legal and quality assurance issues. DNA extraction, DNA quantitation, multiplex amplification of STR loci, capillary electrophoresis of amplified products, and analysis of STR typing data. (Same course as Forensic Science 280.) —W. (W.) Von Beroldingen

### **281. Principles and Practice of Forensic Serology and DNA Analysis (3)**

Lecture—2 hours; lecture/discussion—3 hours. Prerequisite: Forensics/course 278 or Forensics/course 280, or equivalent; consent of instructor. Restricted to students enrolled in the M.S. in Forensic Science Program or by consent of Forensic Science Program Director. Comprehensive overview of forensic serology and DNA typing techniques and technologies. Strong emphasis on real-world applications, including preservation and tracking of biological evidence, detection and identification of bodily fluids, and methods to extract, quantify, and type human DNA. (Same course as Forensic Science 281.) —S. (S.) Rodzen

### **284. Non-Human Forensic DNA—Theory and Casework Application (2)**

Lecture—2 hours. Prerequisite: consent of instructor required for all students not enrolled in the MS Forensics program; upper division Molecular Biology and Genetics or its equivalent. Restricted to graduate standing. Provides a comprehensive understanding of plant and animal forensic biology in terms of sample collection, preservation, analytical methods, and of the invaluable lines of inquiry these forensic evidence may permit. (Same course as Forensic Science 284.) Offered in alternate years.

### **290. Seminar (1)**

Seminar—1 hour. Current topics in environmental toxicology. (S/U grading only.) —F, W, S. (F, W, S.)

### **290C. Advanced Research Conference (1)**

Lecture/discussion—1 hour. Prerequisite: consent of instructor. Presentation and critical discussion of advanced research methods and interpretation of research results. Designed primarily for graduate students. (S/U grading only.) —F, W, S. (F, W, S.)

### **297T. Tutoring in Environmental Toxicology (1-5)**

Hours and duties will vary depending upon course being tutored. Prerequisite: graduate standing in Environmental Toxicology, a related major, or the equivalent experience, and consent of instructor. Teaching toxicology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated for credit up to a total of 5 units. (S/U grading only.)

### **298. Group Study (1-5)**

### **299. Research (1-12)**

(S/U grading only.)

### **Professional**

### **396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.) —F, W, S. (F, W, S.)

## **Epidemiology**

**See Medicine and Epidemiology (VME), on page 582.**

## **Epidemiology (A Graduate Group)**

Philip H. Kass, D.V.M., M.P.V.M., Chairperson of the Group

**Group Office.** 5215 VM3A  
530-752-2657; Fax 530-754-0225  
<http://www.epi.ucdavis.edu>

### **Faculty**

- Sharif Aly, D.V.M., M.P.V.M., Ph.D., Assistant Professor (*Population Health and Reproduction*)  
Nicholas R. Anderson, Ph.D., Assistant Professor (*UC Davis Health System*)  
E. Robert Atwill, D.V.M., Ph.D., Professor (*Population Health and Reproduction*)  
Rahman Azari, Ph.D., Lecturer (*Statistics*)  
Heejung Bang, Ph.D., Associate Professor (*Public Health Sciences*)  
Christopher M. Barker, Ph.D., (*Center for Vectorborne Diseases*)  
Laurel A. Beckett, Ph.D., Professor (*Public Health Sciences*)  
Deborah Bennett, Associate Professor (*Department of Public Health Sciences*)  
Walter Boyce, D.V.M., Ph.D., Professor (*Population Health & Reproduction*)  
Diana Cassady, Dr.P.H., Associate Professor (*Department of Public Health Sciences*)  
Magdalena Cerda, Dr.P.H., M.P.H. (*Department of Emergency Medicine*)  
Munashe Chigerwe, M.P.H., Ph.D, Assistant Professor (*Medicine and Epidemiology*)  
Bruno Chomel, D.V.M., Ph.D., Professor (*Population Health and Reproduction*)  
Patricia Conrad, D.V.M., Ph.D., Professor (*Pathology, Microbiology, and Immunology*)  
Rosemary Cress, Ph.D., Associate Professor (*Public Health Sciences*)  
Beate Crossley, Ph.D., Associate Professor (*California Animal Health and Food Safety Laboratory*)  
Lorian Dalrymple, M.D., M.P.H., Assistant Professor (*Internal Medicine*)  
Adela de la Torre, Ph.D., Professor, Vice Chancellor Student Affairs (*Chicana and Chicano Studies*)  
Kathryn DeRiemer, Ph.D., Associate Professor (*Public Health Sciences*)  
Roberto De Vogli, M.P.H., Ph.D., Associate Professor (*Department of Public Health Sciences*)  
Kathryn Dewey, Ph.D., Professor (*Nutrition*)  
Christiana Drake, Ph.D., Professor (*Statistics*)  
Jonathan Ducore, M.D., Professor (*Pediatrics*)  
Janet Foley, M.S., D.V.M., Ph.D., Professor (*Medicine and Epidemiology*)  
Lorena Garcia, M.P.H., Dr.P.H., Associate Professor (*Department of Public Health Sciences*)  
Lynette Hart, Ph.D., Professor (*Population Health and Reproduction*)  
Danielle Harvey, Ph.D., Associate Professor (*Public Health Sciences*)  
Irva Hertz-Pannier, Ph.D., Professor (*Public Health Sciences*)  
Ashley Hill, D.V.M., M.P.V.M., Ph.D., Assistant Professor (*California Animal Health and Food Safety Laboratory*)  
Martin Hoffman, M.D., Professor (*Physical Medicine and Rehabilitation*)  
Ana-Maria Iosif, Ph.D., Associate Professor (*Public Health Sciences*)  
Jining Jiang, Ph.D., Professor (*Statistics*)  
Philip Kass, M.P.V.M., D.V.M., Ph.D., Professor (*Population Health and Reproduction*)  
Theresa Keegan, Ph.D., M.S., Associate Professor (*Hematology and Oncology*)  
Kyoungmi Kim, Ph.D., Associate Professor (*Department of Public Health Sciences*)  
Richard L. Kravitz, M.D., Professor (*Internal Medicine*)  
Christine Kreuder-Johnson, Ph.D., Associate Professor (*Wildlife Health Center*)  
Michele A. La Merrill, MPH, Ph.D., Assistant Professor (*Environmental Toxicology*)
- Paul Leigh, Ph.D., Professor (*Department of Public Health Sciences*)  
Chin-Shang Li, Ph.D., Professor (*Department of Public Health Sciences*)  
James Marcin, M.D., M.P.H, Professor (*Pediatrics*)  
Beatriz Martinez Lopez, D.V.M., M.P.V.M., Ph.D., Assistant Professor (*Medicine and Epidemiology*)  
Jonna Mazet, Ph.D., Professor (*Wildlife Health Center*)  
Stephen McCurdy, M.D., Professor (*Department of Public Health Sciences*)  
Joy Melnikow, M.D., M.P.H., Professor (*Family and Community Medicine*)  
Diana L. Miglioretti, Ph.D., Professor (*Public Health Sciences*)  
Alda Pires, D.V.M., M.P.V.M, Ph.D., Assistant Specialist and Lecturer (*Population Health & Reproduction*)  
Nicola Pusterla, D.V.M., Ph.D., Professor (*Medicine and Epidemiology*)  
Lihong Qi, Ph.D., Associate Professor (*Department of Public Health Sciences*)  
David M. Rocke, Ph.D., Professor (*Department of Public Health Sciences*)  
Patrick Romano, M.D., M.P.H., Professor (*Internal Medicine*)  
Joan Dean Rowe, M.P.V.M., D.V.M., Ph.D., Associate Professor (*Population Health and Reproduction*)  
Christian Sandrock, M.D., M.P.H., Associate Professor (*Internal Medicine*)  
Marc Schenker, M.D., Professor (*Public Health Sciences*)  
Woutrina Smith, D.V.M., M.P.V.M., Ph.D., Associate Professor (*Pathology, Microbiology and Immunology*)  
Christine Stewart, M.P.H, Ph.D., Assistant Professor (*Department of Nutrition*)  
Robert Szabo, M.D., Professor (*Orthopedic Surgery*)  
Daniel Tancredi, Ph.D., Assistant Professor (*Pediatrics*)  
Michael Zicardi, Ph.D. (*Wildlife Health Center*)

### **Emeriti Faculty**

- Robert Bondurant, D.V.M., Professor Emeritus  
Kenneth Brown, M.D., Professor Emeritus (*Nutrition*)  
James Case, D.V.M., Ph.D., Professor Emeritus  
Nancy East, M.P.V.M., D.V.M., Professor Emeritus  
Bruce Eldridge, Ph.D., Professor Emeritus  
Thomas B. Farver, Ph.D., Professor Emeritus (*Population Health and Reproduction*)  
Neil Flynn, M.D., M.P.H., Professor Emeritus  
David R. Gibson, Ph.D., Professor (*Public Health Sciences*)  
Ellen Gold, Ph.D., Professor (*Public Health Sciences*)  
Sharon Hietala, Ph.D., Professor Emeritus  
David Hird, D.V.M., M.P.V.M., Ph.D., Professor Emeritus  
Sunny Kim, Ph.D., Associate Professor (*Public Health Sciences*)  
William Reisen, Ph.D., Professor Emeritus (*Center for Vectorborne Disease*)  
John Robbins, M.D., M.H.S., Professor Emeritus  
Thomas Scott, Ph.D., Professor (*Entomology*)  
Robert Shumway, Ph.D., Professor Emeritus  
Mark Thurmond, D.V.M., M.P.V.M., Ph.D., Professor Emeritus  
Alvin Wiggins, Ph.D., Professor Emeritus

**Graduate Study.** The Graduate Group in Epidemiology offers programs of study and research leading to the M.S. and Ph.D. degrees. Areas of emphasis include environmental/occupational epidemiology; infectious disease epidemiology; zoonotic and vector-borne diseases; epidemiologic methods and biostatistics; health services and health economics; nutritional epidemiology; reproductive, perinatal, developmental and pediatric epidemiology; wildlife epidemiology; and social and behavioral epidemiology. For detailed information regarding the program, address the chairperson of the group or see the website.

**Graduate Advisers.** Diana Cassady (*Department of Public Health Sciences*), Janet Foley (*Medicine and Epidemiology*), Lynette Hart (*Population Health*)

and Reproduction), Lihong Qi (Public Health Sciences), and William Reisen (Center for Vectorborne Diseases)

## Required Courses for the Program

**Prerequisite Courses.** Prerequisites may be taken concurrently with required courses below.

Mathematics 16A-16B or 21A-21B  
Statistics 102, 106, and 108, or Preventive Veterinary Medicine 402, 403

**Required Courses.** These courses are required of all students in the program; M.S. and Ph.D. degrees. These requirements cannot be waived and must be met before a student's Qualifying Examination.

Epidemiology 202, 203, 204, 205, 206, 207, 208 and 290

One course from: Population Health and Reproduction 202 or Statistics 144

**Related Courses.** For additional course work in Epidemiology, please see Medicine and Epidemiology, Preventive Veterinary Medicine, Population Health and Reproduction, Public Health Sciences, and Statistics.

## Courses in Epidemiology (EPI)

### Graduate

#### 202. Quantitative Epidemiology I: Probability (5)

Lecture—4 hours; laboratory—2 hours. Prerequisite: Mathematics 16A/B or 17A/B or 21A/B or equivalent; Statistics 102 and 108 or Population Health and Reproduction 402 and 403 or equivalent; concurrent or previous enrollment in a basic epidemiology course (e.g., course 205). Foundations in probability for epidemiologists. Emphasis on properties of and relationships between distributions and application of probability concepts to epidemiology. Includes a mathematical skills laboratory to assist in solution of epidemiologic problems.

#### 203. Quantitative Epidemiology II: Statistical Inference (4)

Lecture—3 hours; laboratory/discussion—1 hour. Prerequisite: course 202, or Statistics 130A, or 131A, or 133; basic course in Epidemiology (205 or equivalent). Provides the mathematical statistics foundation for statistical models, methods, and data analysis.

#### 204. Quantitative Epidemiology III: Statistical Models (4)

Lecture—3 hours; laboratory/discussion—1 hour. Prerequisite: course 203, or Statistics 130B, or 131B, or 133; Statistics 108 recommended; basic course in Epidemiology (205 or equivalent); consent of instructor. Introduces statistical models, methods, and data analysis in the areas of generalized linear model and survival analysis methodology.

#### 204A. Foundation of Statistical Models, Methods, and Data Analysis for Scientists (4)

Lecture—3 hours; laboratory/discussion—1 hour. Prerequisite: Statistics 130A, or Statistics 131A, or Statistics 133, course 228 recommended. Provides the mathematical statistics foundation for statistical models, methods, and data analysis. —W. (W.) Bang

#### 204B. Statistical Models, Methods, and Data Analysis for Scientists (4)

Lecture—3 hours; laboratory/discussion—1 hour. Prerequisite: course 204A; Statistics 108 recommended. Introduces statistical models, methods, and data analysis in the areas of generalized linear, survival, and correlated data methodology. —S. (S.) Li

#### 205. Principles of Epidemiology (4)

Lecture—4 hours. Prerequisite: Preventive Veterinary Medicine 202, an introductory statistics course, or consent of the instructor. Basic epidemiologic concepts and approaches to epidemiologic research, with examples from veterinary and human medicine, including outbreak investigation, infectious disease epidemiology, properties of tests, and an introduc-

tion to epidemiologic study design and surveillance. (Same course as Preventive Veterinary Medicine 205.) —F. (F.)

#### 205A. Principles of Epidemiology (4)

Lecture—4 hours. Prerequisite: Preventive Veterinary Medicine 402 or consent of instructor. Basic epidemiologic concepts and approaches to epidemiologic research, with examples from veterinary and human medicine, including outbreak investigation, infectious disease epidemiology, properties of tests, and an introduction to epidemiologic study design and surveillance. (Same course as Preventive Veterinary Medicine 405.)

#### 205B. Integration of Epidemiologic Concepts (2)

Discussion—2 hours. Prerequisite: Preventive Veterinary Medicine 405/course 205A can be taken concurrently. In-depth analysis and integration of basic epidemiologic concepts and approaches to epidemiologic research presented in Preventive Veterinary Medicine 405/course 205A, with more mathematical and theoretical basis and examples from veterinary and human medicine, including outbreak investigation, infectious disease epidemiology, properties of diagnostic tests, study design, and surveillance. —F. (F.)

#### 206. Epidemiologic Study Design (4)

Lecture—30 sessions; discussion—9 sessions; laboratory—2 sessions. Prerequisite: course 205 or consent of instructor. Builds on concepts presented in course 205. Concepts of epidemiologic study design—clinical trials, observational cohort studies, case control studies—introduced in course 205A are covered in more depth, using a problem-based format. Discussion of published epidemiologic studies. (Same course as Preventive Veterinary Medicine 206.)

#### 207. Advanced Epidemiologic Methodology (4)

Lecture/discussion—4 hours. Prerequisite: course 206. In-depth integration of advanced epidemiological concepts. Theory, methods, and applications for observational studies including random and systematic error, confounding, counterfactuals, causal inference, effect modification, internal and external validity, estimability, and interpretation of effect measures, and advanced study designs. (Same course as Public Health Sciences 207.) —S. (S.) Hertz-Pannier

#### 208. Analysis and Interpretation of Epidemiologic Data (3)

Lecture—16 sessions; laboratory—21 sessions; project. Prerequisite: course 204 (may be taken concurrently) and 207, and either Statistics 144 or Population Health and Reproduction 202 and entry level skill in standard statistical software (e.g., SPSS, BMDP, SAS, Stata, MinTab, S-Plus). Application of theory and concepts of statistics and epidemiology to analysis and interpretation of data typically found in veterinary and human epidemiologic research. —F. (F.) Beckett

#### 209. History of Epidemiology in Public Health (2)

Lecture—0.5 hours; discussion—1.5 hours. Introduction to the history of epidemiology in solving major public health problems. Original historical articles will be read/discussed. Topics may include: infectious disease, accidents/adverse events, nutritional deficiencies, community vaccination trials, occupational exposures, cancer, birth defects, cardiovascular disease, and smoking. (Same course as Public Health Sciences 209.) —W. (W.) Hertz-Pannier

#### 220. Problems in Epidemiologic Study Design (4)

Lecture—3 hours; term paper. Prerequisite: Preventive Veterinary Medicine 405 and 406 or the equivalent; Population Health and Reproduction 207 concurrently; Statistics 102 and 106 or the equivalent. Design and development of research protocols and funding applications for peer review. Application of research methods data collection and management and statistical analysis in research

proposals. Methods of evaluating research proposals, mechanisms of funding, specifying human subjects considerations. —S. (S.)

#### 222. Epidemiological Modeling (3)

Lecture—2 hours; laboratory—3 hours. Prerequisite: Preventive Veterinary Medicine 405. Techniques of model building and simulation of infectious diseases will be explored. Epidemiologic modeling philosophy, construction and validation will be emphasized. Offered in alternate years. —W.

#### 223. Spatial Epidemiology (3)

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 205A or Preventive Veterinary Medicine 205. Geographic Information Systems (GIS) and spatial statistics. Students are expected to complete a term project based on their graduate research. Offered in alternate years. —W. (W.)

#### 224. Health and Ecological Risk Analysis (3)

Lecture—2 hours; laboratory—3 hours. Prerequisite: Preventive Veterinary Medicine 406 or consent of instructor; background in statistics, including multivariable techniques; a course in differential equations. A methodological approach to risk analysis for human and animal-related health and ecological issues. Basic principles of risk analysis, including perception, communication, assessment and management. Emphasis on the assessment of risk. —S. (S.)

#### 225. Advanced Topics in Epidemiology Methods (2)

Discussion—2 hours. Prerequisite: courses 205B, 206, and 207 (or equivalents, with consent of instructor). An in-depth study of topics in epidemiology theory and methods, selected from: causal inference, confounding, study design, or other related areas, with year to year variation. Readings are assigned and students are expected to lead discussions on them. May be repeated for credit when topic differs. Offered irregularly. —S. Hertz-Pannier

#### 226. Methods for Longitudinal and Repeated Measurement Data (3)

Lecture—2 hours; discussion—1 hour. Prerequisite: course 204 or consent of instructor. Mixed models for longitudinal data (LD)/repeated measurements; Mean and covariance models; General linear LD models; Random coefficients models; Linear mixed effects models for continuous outcome; Generalized linear mixed effects model for discrete outcome including binary, ordinal and count data. —F. (F.) Nguyen

#### 229. Geographic Information Systems for Health Professionals (4)

Lecture—2 hours; laboratory—6 hours. Emphasis on basic geographic and data management principles. Focus on software proficiency in application to analyzing/solving health-related problems. For graduate and professional students in epidemiology, public health, preventive veterinary medicine, health informatics with interest in spatial techniques in research. —S. (S.)

#### 230. Introduction to Molecular Epidemiology (3)

Lecture/discussion—3 hours. Prerequisite: course 205. Overview of the modern field of molecular epidemiology. Integrates molecular biology into traditional epidemiologic research by identifying pathways, molecules and genes that influence the risk of developing disease. —S. Schmidt

#### 231. Infectious Disease Epidemiology (3)

Lecture—2 hours; discussion—1 hour. Prerequisite: introductory epidemiology course (e.g., course 205). Infectious disease epidemiology and prevention, with emphasis on human and veterinary diseases of global health importance. Major global health epidemics and challenges of infectious diseases, by mode of transmission. (Same course as Public Health Sciences 211.) —W. (W.) DeRiemer

#### 240. Principles of Injury Epidemiology (3)

Lecture/discussion—3 hours. Overview of the epidemiology of human injury, including general principles, surveillance methods, behavioral factors,

environmental factors, treatment issues and engineering and legal interventions related to vehicular injuries, drownings, falls, fires and burns, poisonings, firearm injuries, and other intentional injuries.—W. (W.) Romano

### 251. Environmental Epidemiology (3)

Lecture—3 hours. Prerequisite: Preventive Veterinary Medicine 405 (may be taken concurrently); upper division undergraduates who have completed Environmental Studies 126; or the equivalent. Examination of the human health effects and the risk of disease from community, occupational, and personal exposure to toxic substances. Offered in alternate years.—F. Schenker

### 252. Social Epidemiology (2)

Lecture/discussion—2 hours. Prerequisite: course 205A; consent of instructor. Social determinants of health; psychosocial and physiological pathways; health and social inequality; gender and racial/ethnic disparities in health; social support, social cohesion and health; social gradient in behavioral risk factors; social ecological approaches to health intervention; interventions addressing social determinants. (Same Course as Public Health Sciences 252.)—S. (S.)

### 260. Epidemiology of Chronic Diseases and Aging (3)

Lecture/discussion—3 hours. Overview of the epidemiology of chronic disease in old age. Topics include biology of aging, epidemiology of cardiovascular disease, neoplasms, osteoporosis and fractures, psychosocial factors and health in old age, dementias, functional status and prevention of disease.—W. (W.)

### 270. Research Methods in Occupational Epidemiology (3)

Laboratory/discussion—3 hours. Prerequisite: course 205A or Preventive Veterinary Medicine 205; Statistics 102 or Preventive Veterinary Medicine 202. Methods used in epidemiologic research on occupational hazards. Topics include design and analysis of cohort and case-control studies, sample size, measuring dose, choosing a control group, validation of employment and health data, interpreting negative studies, and analysis software. Offered in alternate years.—S. (S.) Beaumont

### 272. Cancer Epidemiology (2)

Recitation—1 hour; discussion—1 hour. Prerequisite: must have basic understanding of epidemiologic and statistical concepts that are covered in courses 205A, 205B, 206 (may be taken concurrently), and Statistics 102. We will cover the underlying concepts essential to understanding cancer epidemiology, such as trends in incidence and survival, epidemiologic methods used to assess cancer etiology, prevention and control, and an introduction to the carcinogenesis and progression multi-stage model.—W. (W.) Cress

### 290. Seminars in Epidemiology (0.5)

Seminar—0.5 hours. Faculty and students will present and lead discussion of ongoing or published epidemiologic research. (S/U grading only.)—F, W, S. (F, W, S.)

### 291. Seminars in Human Health Services Research and Clinical Epidemiology (1)

Seminar—1 hour. Critical review, evaluation, and discussion of research in health services and clinical epidemiology. Presentation of statistical, epidemiologic, and econometric methods. Students present their own research and critique the work of others. May be repeated for credit. (Same course as General Medicine 291.) (S/U grading only.)—F, W, S. (F, W, S.)

### 298. Group Study (1-5)

Seminar—1-5 hours. Group study in selected areas of epidemiology.

### 299. Research (1-12)

Research in selected areas of epidemiology. (S/U grading only.)

## Evolution and Ecology

(College of Biological Sciences)

Sharon Strauss, Ph.D., Chairperson of the Department

**Department Office.** 2320 Storer Hall  
530-752-1272; <http://www.eve.ucdavis.edu>

### Faculty

David J. Begun, Ph.D., Professor  
Graham Coop, Ph.D., Associate Professor  
Jonathan A. Eisen, Ph.D., Professor  
*(Medical Microbiology and Immunology)*  
Brian P. Gaylord, Ph.D., Professor  
Jennifer R. Gremer, Ph.D., Assistant Professor  
Richard K. Grosberg, Ph.D., Professor  
*Academic Senate Distinguished Teaching Award,  
UC Davis Prize for Teaching and Scholarly  
Achievement*

Susan L. Keen, Ph.D., Senior Lecturer, SOE  
*Academic Federation Excellence in Teaching  
Award*

Aryom V. Kopp, Ph.D., Professor  
Charles H. Langley, Ph.D., Professor  
Harris A. Lewin, Ph.D., Professor  
*(Vet Med: Population Health and Reproduction)*

Susan E. Lott, Ph.D., Assistant Professor  
Brian R. Moore, Ph.D., Assistant Professor

Gail L. Patricelli, Ph.D., Professor

Santiago Ramirez, Ph.D., Assistant Professor

Bruce H. Rannala, Ph.D., Professor

Marcel Rejmánek, Ph.D., Professor

Eric D. Sanford, Ph.D., Professor

Johanna M. Schmitt, Ph.D., Professor

Thomas W. Schoener, Ph.D., Professor

Sebastian Schreiber, Ph.D., Professor

Arthur M. Shapiro, Ph.D., Professor

*Academic Senate Distinguished Teaching Award*

John J. Stachowicz, Ph.D., Professor

*Academic Senate Distinguished Teaching Award  
UC Davis Prize for Teaching and Scholarly  
Achievement*

Sharon Y. Strauss, Ph.D., Professor

*Academic Senate Distinguished Teaching Award*

Donald R. Strong, Ph.D., Professor

Michael Turelli, Ph.D., Professor

Peter C. Wainwright, Ph.D., Professor

*Academic Senate Distinguished Teaching Award*

Susan Williams, Ph.D., Professor

### Emeriti Faculty

James A. Doyle, Ph.D., Professor Emeritus

John H. Gillespie, Ph.D., Professor Emeritus

Milton Hildebrand, Ph.D., Professor Emeritus

*Academic Senate Distinguished Teaching Award*

Robert W. Pearcy, Ph.D., Professor Emeritus

Judy A. Stamps, Ph.D., Professor Emeritus

Kenneth E. F. Watt, Ph.D., LL.D., Professor Emeritus

### Affiliated Faculty

Carole Hom, Ph.D., Academic Coordinator

R. Pat Randolph, Ph.D., Academic Coordinator/Lecturer

David A. Spiller, Ph.D., Project Scientist Emeritus

### The Evolution, Ecology and Biodiversity Major Program

The major in Evolution, Ecology and Biodiversity offers the student a broad background in the theoretical and empirical basis of our understanding of the diversity and distribution of living organisms.

**The Program.** The program of study for the major begins with a core of introductory courses in mathematics, physical sciences, and biology. These are followed by survey courses in biodiversity, evolution and ecology and various more specialized courses that focus the student on particular disciplines or organisms, with an emphasis on problem-solving and critical thinking. Evolution, Ecology and Biodiversity majors may earn either a Bachelor of Science

or a Bachelor of Arts degree. The requirements for the B.S. degree program include more science courses, such as biochemistry, whereas those for the A.B. degree program allow room for more electives within the humanities and social sciences. The A.B. degree is especially appropriate for those students who wish to combine arts or languages with evolution and ecology for career preparation in such areas as scientific writing, translating or illustration.

**Career Alternatives.** A degree in Evolution, Ecology and Biodiversity prepares the student for career opportunities in research, teaching, health professions, veterinary medicine, agriculture, environmental management, and industry. Many students gain some research experience while at UC Davis and choose to continue their training at the graduate level. This track offers careers in academics, government, environmental organizations, or business.

### A.B. Major Requirements:

UNITS

#### Preparatory Subject Matter ..... 41-45

Biological Sciences 2A-2B-2C .....	15
Chemistry 2A-2B .....	10
Chemistry 8A-8B .....	6
Mathematics 17A-17B (17C recommended) or 21A-21B (21C recommended) or Statistics 100 or 102 .....	4-8
Physics 1A-1B .....	6

#### Depth Subject Matter ..... 36

Biological Sciences 101 .....	4
One course from: Evolution and Ecology 100; Geology 107; Anthropology 151 .....	3-4
One course from: Evolution and Ecology 101; Environmental Science and Policy 100; Wildlife, Fish, and Conservation Biology 151 .....	4
Additional upper division course work in biological science to achieve a total of 36 or more units .....	24-25

Include at least one course from each of the areas of study below.

#### Areas of Study:

(1) *Biodiversity:* Entomology 103;  
Evolution and Ecology 105, 108, 112,  
140; Microbiology 105; Nematology  
110; Plant Biology 116, 148; Plant  
Sciences 147; Wildlife, Fish, and  
Conservation Biology 110, 111, 120,  
134.

(2) *Advanced Evolution and Ecology:*  
Evolution and Ecology 102, 103, 104,  
107, 115, 117, 119, 120, 131, 138,  
141, 147, 149, 150, 161, 180A and  
180B, 181.

Note: A maximum of four units of variable-unit courses (numbered 192, 198, 199) may be applied to upper division elective unit requirements. Courses numbered 197T are not applicable to the upper division elective unit requirement.

#### Total Units for the Major ..... 77-81

### B.S. Major Requirements:

UNITS

#### Preparatory Subject Matter ..... 56-66

Biological Sciences 2A-2B-2C .....	15
Chemistry 2A-2B-2C .....	15
Chemistry 8A-8B or 118A-118B-118C .....	6-12
Mathematics 17A-17B-17C or 21A-21B (21C recommended) .....	8-12
Physics 7A-7B-7C .....	12

#### Depth Subject Matter ..... 49

Biological Sciences 101, 105 (or 102+103), 104 .....	10-13
Evolution and Ecology 100, 101 .....	8
Statistics 100, 102 or 130A-130B .....	4-8
Additional upper division course work in biological science to achieve a total of 49 or more units, including at least a total of two	

units (6 hours per week) of laboratory or fieldwork..... 20-27

Include at least one course from the Biodiversity area of study and two courses from the Advanced Evolution and Ecology areas of study below.

#### **Areas of Study:**

(1) *Biodiversity*: Entomology 103; Evolution and Ecology 105, 108, 112, 140; Microbiology 105; Nematology 110; Plant Biology 116, 148; Plant Sciences 147; Wildlife, Fish, and Conservation Biology 110, 111, 120, 134.

(2) *Advanced Evolution and Ecology*: Evolution and Ecology 102, 103, 104, 107, 115, 117, 119, 120, 131, 138, 141, 147, 149, 150, 161, 180A and 180B, 181.

Note: A maximum of 4 units of variable-unit courses (numbered 192, 198, 199) may be applied to upper division elective unit requirements, but not to the upper division laboratory requirement. Courses numbered 197T are not applicable to the upper division elective unit requirement.

#### **Total Units for the Major ..... 105-115**

#### **Biological Sciences Electives**

The following courses are acceptable toward the fulfillment of the upper division biological sciences requirement in the A.B. and B.S. major programs and may be selected without adviser approval. Other elective courses are approved on an individual basis by petition through an adviser.

Anatomy, Physiology and Cell Biology 100  
Anthropology 151, 152, 153, 154A, 154BN, 154C, 154CL, 155, 156  
Biological Sciences, all upper division courses  
Chemistry 107A, 107B  
Entomology, all upper division courses except 110  
Environmental Science and Policy 110, 116, 121, 123, 150C, 151, 151L  
Evolution and Ecology 190  
Geology 107, 107L, 150C  
Microbiology, all upper division courses  
Molecular and Cellular Biology, all upper division courses  
Nematology 110  
Neurobiology, Physiology, and Behavior, all upper division courses  
Nutrition 101, 111  
Pathology, Microbiology, and Immunology 101, 126, 126L, 128  
Philosophy 108  
Plant Biology, all upper division courses  
Psychology 121, 122, 127, 129  
Wildlife, Fish, and Conservation Biology 120, 120L, 121

#### **Minor Program Requirements:**

UNITS

#### **Evolution, Ecology and Biodiversity ..... 18**

Evolution and Ecology 100, 101 ..... 8

One course in Biodiversity ..... 3.5

Entomology 103; Evolution and Ecology 105\*, 108\*, 112, 112L\*, 114\*, 140\*; Plant Biology 116\*, 148\*; Plant Sciences 147\*; Wildlife, Fish and Conservation Biology 110, 110L\*, 111, 111L\*, 120, 120L\*, 134, 134L\*; Microbiology 105, 105L\*; Nematology 110

Two courses in Advanced Ecology or

Evolution ..... 6-9

Evolution and Ecology 102, 103, 107, 115, 117\*, 119\*, 120, 131, 138, 141, 147, 149, 150, 161, 180A\* and 180B\*, 181

Laboratory or field course: At least one of the courses taken to fulfill these requirements must include a laboratory or field component.

\*Appropriate courses from the above lists are indicated with an asterisk.

\*‡These courses cannot be taken without the corresponding lecture course. Additional courses, if necessary, from above course lists to reach 18 units.

**Major Advisers.** Students transferring to UC Davis from another institution and majoring in Evolution, Ecology and Biodiversity must consult an adviser immediately upon matriculation so that their transfer credits can be applied to the major requirements. All new students in the major should contact the Biology Academic Success Center for adviser assignment. Substitutions of courses not on the above list for major requirements are arranged through the adviser.

**Advising Center** for the major is located at the Biology Academic Success Center (BASC); 1023 Sciences Laboratory Building; 530-752-0410; <http://basc.ucdavis.edu/>. Pre-professional students should visit the Health Professions Advising office at <http://hpa.ucdavis.edu/> for information on pre-health requirements and to subscribe to their email list.

**Teaching Credential Subject Representative.** Students planning for a teaching career should consult the School of Education in regard to preparation for certification; see the Teaching Credential/M.A. Program on page 124.

#### **Courses in Evolution and Ecology (EVE)**

##### **Lower Division**

###### **2. Biodiversity (3)**

Lecture—2 hours; lecture/discussion—1 hour. Introduction to nature, scope and geographical distribution of biodiversity (the diversity of life, with emphasis on plants and animals, especially insects). Humans and biodiversity—domestication, aesthetics, ethics and valuation. Species richness and “success.” Biodiversity through time; monitoring, evaluation and conservation. Biomes—global, continental and Californian. (Same course as Entomology 2.) Offered irregularly. GE credit: SciEng, Wrt | SE, SL, WE.

###### **10. Evolution for Non-Biologists (4)**

Lecture—3 hours. Introduction to evolutionary biology for the general population. Offered in alternate years. GE credit: SciEng | QL, SE, SL. —(F.) Begun

###### **11. Principles of Ecology (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: elementary biology recommended. Ecological principles with emphasis on humans and their interactions with the environment; how humans affect and depend on natural ecosystems; the future of the Earth's biosphere. Offered irregularly. GE credit: SciEng | OL, SE, SL, WE.

###### **12. Life in the Sea (3)**

Lecture—3 hours. Limited enrollment. Diversity of life in the sea; adaptations to physical/chemical ocean environment; marine science research methods; utilization of living marine resources by humans; factors and processes that influence diversity of sea life, including humans. GE credit: SciEng | SE, SL. —S. (S.) Williams

###### **13. Sex in the Natural World (3)**

Lecture/discussion—3 hours. Explores the diversity, mechanisms and evolution of sexual behaviors across the kingdoms of life. Offered in alternate years. GE credit: SciEng | SE, SL, VL. —F. Patricelli

###### **20. Darwinian Medicine (3)**

Lecture—3 hours. Introduction for non-biologists to the evolved traits of humans and pathogens that influence human biological variation, health, and disease. Offered in alternate years. GE credit: QL, SE, SL. —(F.) Begun

###### **92. Internship (1-12)**

Internship—3-36 hours. Prerequisite: lower division standing; consent of instructor. Work experience off and on campus in all subject areas offered in the Department of Evolution and Ecology. Internships

supervised by a member of the faculty. May be repeated for credit. (P/NP grading only.) —F, W, S. (F, W, S.)

###### **98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) GE credit: SE. —F, W, S. (F, W, S.)

###### **99. Special Study for Lower Division Students (1-5)**

(P/NP grading only.) GE credit: SE. —F, W, S. (F, W, S.)

#### **Upper Division**

##### **100. Introduction to Evolution (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B, 1C, or 2A, 2B, 2C; Biological Sciences 101; Mathematics 16A, 16B, 16C or the equivalent; Statistics 13 or 100 (Statistics 100 recommended). A general survey of the origins of biological diversity and evolutionary mechanisms. GE credit: SciEng | QL, SE, SL. —F, W, Su. (F, W, S, Su.) Begun, Coop, Ramirez

###### **101. Introduction to Ecology (4)**

Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B, 1C, or 2A, 2B, 2C; Mathematics 16A, 16B, 16C or the equivalent. A general survey of the principles of ecology. GE credit: SciEng | QL, SE, SL, VL. —F, W, Su. (F, W, S, Su.) Gaylord, Rejmanek, Schoener, Strong

###### **101Q. Introduction to Computer Models in Ecology (1)**

Autotutorial—1.5 hours; extensive problem solving—1.5 hours. Prerequisite: concurrent enrollment in course 101. Computational methods and mathematical models used to study ecological phenomena. Offered irregularly.

###### **102. Population and Quantitative Genetics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 101, and Statistics 100 or 102, and course 100. Evolution as caused by random mating, genetic drift, natural selection, inbreeding, migration, and mutation in theory and actuality. The resemblance between relatives and consequences of selection for quantitative traits. Application of these ideas to topics such as the evolution of sex. Offered in alternate years. GE credit: SciEng | SE. —F. Langley

###### **103. Phylogeny, Speciation and Macroevolution (4)**

Lecture—3 hours; laboratory/discussion—3 hours. Prerequisite: course 100. Statistical inference of evolutionary patterns and processes above the species level. Topics include estimation of phylogenies and divergence times, character evolution, biogeographic history, and rates and patterns of lineage diversification, with an emphasis on the origin of species. Offered in alternate years. GE credit: SciEng | QL, SE, SL. —(W.) Moore, Turelli

###### **104. Community Ecology (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 101 or Environmental Science and Policy 100. Population growth and density dependence; predation; exploitative, interference and apparent competition; coexistence mechanisms; niches, spatial and temporal variation; stability, diversity, and productivity of food webs; applications to conservation and biological control. Emphasis on quantitative understanding through models, concepts, and empirical evidence. Offered irregularly. GE credit: SciEng | SE, SL, VL.

###### **105. Phylogenetic Analysis of Vertebrate Structure (4)**

Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A and 1B, or 2B and 2C. The structure of the classes and subclasses of vertebrates is described and interpreted in terms of phylogeny. Offered in alternate years. GE credit: SciEng | SE. —S. Wainwright

###### **106. Mechanical Design in Organisms (3)**

Lecture—2 hours; discussion—1 hour; laboratory—3 hours; fieldwork—3 hours. Prerequisite: upper division standing or consent of instructor; introductory

animal biology (Biological Sciences 1B or 2B), invertebrate zoology (course 112), and/or ecology (course 101) are recommended; residence at or near Bodega Marine Lab required. Enrollment restricted to application at <http://www.bml.ucdavis.edu>. Explores fundamental principles in the form and function of organisms, examining how basic properties of size, shape, structure, and habitat constrain ways in which plants and animals interact and cope with their physical surroundings. Offered in alternate years. GE credit: SciEng | QL, SE, VL, WE.

#### **107. Animal Communication (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 2B. How animals use songs, dances, colors, chemicals, electricity and vibrations to communicate. Mechanisms of signal production and detection (sensory systems), theory of information transfer and signal design, and the role of natural selection in shaping communication. Offered in alternate years. GE credit: SciEng | QL, SE, VL.—(F.) Patricelli

#### **108. Systematics and Evolution of Angiosperms (5)**

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or 2A, 2B, 2C. Diversity and classification of angiosperms (flowering plants) on a world scale, and current understanding of the origin of angiosperms and evolutionary relationships and trends within them based on morphological and molecular evidence. (Same course as Plant Biology 108.) GE credit: SciEng.—S. (S.) Potter

#### **110. Running, Swimming and Flying (3)**

Lecture—2 hours; discussion—1 hour; laboratory—3 hours; fieldwork—3 hours. Prerequisite: upper division standing or consent of instructor; introductory animal biology (Biological Sciences 1B or 2B), invertebrate zoology (course 112), and/or ecology (course 101) are recommended; residence at or near Bodega Marine Lab required. Enrollment restricted to application at <http://www.bml.ucdavis.edu>. Examines the bases of organism movement in terrestrial, aquatic, and aerial environments, emphasizing both the unifying principles underlying locomotion, as well as a range of strategies employed across diverse groups of organisms. Offered irregularly. GE credit: SciEng | QL, SE, VL, WE.

#### **111. Marine Environmental Issues (1)**

Discussion—1 hour. Prerequisite: consent of instructor. Examination of critical environmental issues occurring in coastal waters including the effects of climate change, overfishing, and other human impacts. Through readings and group discussions, students will develop an integrative understanding of the oceanographic and ecological processes. May be repeated two times for credit when topics differ. (Same course as Environmental Science and Policy 111.) GE credit: SciEng | SE, SL.—S. Su, (S. Su.) Gaylord, Hill, Largier, Morgan, Sanford, Williams

#### **112. Biology of Invertebrates (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 1B, or 2B and 2C; courses in systematics, ecology, and evolution recommended. Limited enrollment. Survey of the invertebrate phyla, emphasizing aquatic forms, and focusing on morphology, development, natural history, ecology, and phylogenetic relationships. Offered in alternate years.—(W.) Grosberg, Sanford

#### **112L. Biology of Invertebrates Laboratory (2)**

Laboratory—6 hours. Prerequisite: Biological Sciences 1B, or 2B and 2C; course 112 concurrently. Enrollment limited to 50 students. Field and laboratory experience with representative members of the major invertebrate phyla discussed in course 112. Emphasis on comparative morphology, natural history, ecology, and behavior of living invertebrates. Two field trips required. Offered in alternate years.—(W.) Grosberg, Sanford

#### **114. Experimental Invertebrate Biology (3)**

Lecture—2 hours; discussion—1 hour; laboratory—3 hours; fieldwork—3 hours. Prerequisite: upper division standing or consent of instructor; introductory cell, animal and plant biology (Biological Sciences 1A, 1B and 1C), invertebrate zoology (Evolution and Ecology 112), ecology (Evolution and Ecology 101), and/or evolution (Evolution and Ecology 100) are recommended; residence at or near Bodega Marine Lab required. Enrollment restricted to application at <http://www.bml.ucdavis.edu>. Biology, ecology, and evolution of local marine invertebrates with a focus on adaptations to environmental and biological factors encountered on the California coast. Hands-on field and laboratory learning with an emphasis on generating and testing hypotheses. GE credit: SciEng | QL, SE, VL, WE.—Su. (Su.) Sanford

#### **115. Marine Ecology (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 101 or Environmental Science and Policy 100 or Biological Sciences 2B, or consent of instructor. Processes affecting the distribution, abundance, and diversity of plant and animal life in the sea. Introduction to marine habitat diversity and human impacts on marine ecosystems. Offered in alternate years. GE credit: SciEng | SE, SL, VL, WE.—W. Stachowicz

#### **117. Plant Ecology (4)**

Lecture—3 hours; fieldwork—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or 2A, 2B, 2C; Plant Biology 111 recommended. The study of the interactions between plants, plant populations or vegetation types and their physical and biological environment. Special emphasis on California. Four full-day field trips and brief write-up of class project required. (Same course as Plant Biology 117.)—F. (F.) Latimer, Rejmanek

#### **119. Population Biology of Invasive Plants and Weeds (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or 2A, 2B, 2C; introductory statistics recommended. Origin and evolution of invasive plant species and weeds, reproduction and dispersal, seed ecology, modeling of population dynamics, interactions between invasive species, native species, and crops, biological control. Laboratories emphasize design of competition experiments and identification of weedy species. (Same course as Plant Biology 119.) Offered in alternate years. GE credit: SciEng | SE.—S. Rejmanek

#### **120. Global Change Ecology (3)**

Lecture/discussion—3 hours. Prerequisite: course 100 and 101 or equivalents. Treatment of historical evolution of the biosphere resulting from physical, chemical, and biological influences. Special focus upon changes caused by humans. Topics pertain to biodiversity, resources, conservation, and ecosystem services. Offered irregularly.—F. Su (F. Su.) Gaylord, Strong

#### **131. Human Genetic Variation and Evolution (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 1B or 2B. Introduction to genome-wide nucleotide sequence variation in human populations and computational methods for its analysis. Topics to include forensics, disease gene mapping, and studies of human evolutionary history. Misuses, such as eugenics, and ethical/legal issues will be discussed. Offered in alternate years.—W. Rannala

#### **138. Ecology of Tropical Latitudes (5)**

Lecture—3 hours; discussion—1 hour; extensive writing. Prerequisite: one course in Biological Sciences, Entomology, Wildlife, Fish, and Conservation Biology, Geography, or tropical experience, or consent of instructor. Biological, physical, and human-related aspects of the ecology of low latitudes. Distribution, numbers, and relationships of tropical organisms. Problems of development and conservation in the context of ecological and evolutionary theory. Offered in alternate years. GE credit: SciEng, Wrt | SE, SL, WE.—(S.) Shapiro

#### **140. Paleobotany (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or 2A, 2B, 2C. Introduction to plant fossil record, beginning with invasion of land in the Silurian, emphasizing origin and evolution of major groups and adaptations and changing composition and distribution of floras in relation to plate tectonics and climatic change. Offered irregularly.

#### **141. Principles of Systematics (3)**

Lecture—2 hours; independent study. Prerequisite: Biological Sciences 1B or 1C or 2B; course 100 recommended. Historical background, philosophical rationale, contemporary approaches, and working rules of biosystematics, including International Code of Zoological Nomenclature. Offered in alternate years. GE credit: SciEng, Wrt | OL, QL, SE, SL, VL, WE.—S. Shapiro

#### **147. Biogeography (4)**

Lecture—3 hours; term paper. Prerequisite: Biological Sciences 1A and 1B, or 2B. Movements of terrestrial organisms. The role of geologic, climatic, and biologic changes in the geographic distribution of organisms. Offered in alternate years. GE credit: SciEng | QL, SE, SL, VL, WE.—F. Shapiro

#### **149. Evolution of Ecological Systems (4)**

Lecture—3 hours; term paper. Prerequisite: course 101 or Environmental Science 100 (or the equivalent), and course 100 (or the equivalent). Evolution as an organizing force in natural communities. Co-adaptation in trophic and competitive relationships. Ecology of polymorphisms, clines, and speciation. Offered in alternate years. GE credit: SciEng | SE, SL, WE.—(F.) Shapiro

#### **150. Evolution of Animal Development (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 101; and course 100 (may be waived for graduate students with consent of instructor). Comparative analysis of animal development and the genetic basis of morphological diversification. Offered in alternate years. GE credit: SE, WE.—Kopp

#### **161. Microbial Phylogenomics—Genomic Perspectives on the Diversity and Diversification of Microbes (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 2A, 2B, and 2C or equivalent. Use of DNA and genomic sequencing in studies of the diversity of microorganisms. Diversity of microbes, phylogenetics, genome sequencing, comparative genomics, phylogenomics, lateral gene transfer, molecular ecology, metagenomics, and studies of the human microbiome. Offered in alternate years. GE credit: SciEng | SE.—(W.) Eisen

#### **175. Computational Genetics (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 101 and Statistics 100 or 102. The use of computers to solve problems in genetics and evolution. Introduction to a general purpose computer language (Python), computational statistical methods, and applications such as QTL mapping, linkage detection, estimation of rates of evolution, and gene finding. Offered irregularly.

#### **180A. Experimental Ecology and Evolution in the Field (4)**

Lecture/laboratory—3 hours; fieldwork—3 hours. Prerequisite: course 100; course 101, or Environmental Science and Policy 100; Entomology 105. Experimental design in field ecology. Examination of primary literature, experimental design, independent and collaborative research, analysis of data, development of original research paper based on field experiments. (Same course as Entomology 180A.) (Deferred grading only, pending completion of sequence.) Offered in alternate years. GE credit: SciEng | QL, SE, VL.—W. Yang

#### **180B. Experimental Ecology and Evolution in the Field (4)**

Lecture/laboratory—3 hours; fieldwork—3 hours. Prerequisite: Evolution and Ecology or Entomology 180A; course 100; course 101 or Environmental Science and Policy 100; Entomology 105. Experimental design in field ecology. Examination of primary literature, experimental design, independent

and collaborative research, analysis of data, development of original research paper based on field experiments. (Same course as Entomology 180B.) (Deferred grading only, pending completion of sequence.) Offered in alternate years. GE credit: SciEng | QL, SE, VL WE.—S. Yang

### **181. Ecology and Evolution of Animal-Plant Interactions (4)**

Lecture—1.5 hours; lecture/discussion—1.5 hours; term paper; extensive writing or discussion. Prerequisite: Biological Sciences 2B and 2C required; Biological Sciences 2C may be taken concurrently. Animal adaptations for eating plants, pollinating flowers, dispersing seeds. Plant adaptations to herbivore defense, attraction of mutualists; role of coevolutionary arms race, mutualists and cheaters in plant/animal speciation. Exploration through lectures, original scientific literature, discussions and term paper. Offered in alternate years. GE credit: SciEng | OL, QL, SE, SL, WE.—F. Strauss

### **189. Introduction to Biological Research (1)**

Discussion—1 hour. Prerequisite: upper division standing in Evolution and Ecology or related biological science; consent of instructor. Introduction to research methods in biology. Presentation and discussion of research by faculty, graduate, and undergraduate students. May be repeated for credit up to a total of 6 units. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

### **190. Undergraduate Seminar (2)**

Seminar—2 hours. Prerequisite: upper division standing in the biological sciences or a related discipline. Student reports on current topics with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and reports of undergraduate research may be included. May be repeated for credit. (P/NP grading only.) GE credit: SE.—F. (F.) Shapiro

### **192. Internship (1-12)**

Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in all subject areas offered in the Department of Evolution and Ecology. Internships supervised by a member of the faculty. (P/NP grading only.)—F, W, S. (F, W, S.)

### **194HA. Research Honors (2)**

Laboratory—6 hours. Prerequisite: students who have completed 135 units and qualify for the honors program (as defined by the current catalog). Students pursue intensive research under the guidance of a faculty adviser. Students are expected to complete the full three-quarter sequence culminating in the writing of an honors thesis. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | SE, WE.—F, W, S. (F, W, S.)

### **194HB. Research Honors (2)**

Laboratory—6 hours. Prerequisite: students who have completed 135 units and qualify for the honors program (as defined by the current catalog). Students pursue intensive research under the guidance of a faculty adviser. Students are expected to complete the full three-quarter sequence culminating in the writing of an honors thesis. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | SE, WE.—F, W, S. (F, W, S.)

### **194HC. Research Honors (2)**

Laboratory—6 hours. Prerequisite: students who have completed 135 units and qualify for the honors program (as defined by the current catalog). Students pursue intensive research under the guidance of a faculty adviser. Students are expected to complete the full three-quarter sequence culminating in the writing of an honors thesis. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | SE, WE.—F, W, S. (F, W, S.)

### **197T. Tutoring in Biological Sciences 2B (1-2)**

Tutorial—3-6 hours. Prerequisite: Biological Sciences 1B or Biological Sciences 2B with a grade of B or better. Assisting the instructor by tutoring students in

a Biological Sciences 2B laboratory. Tutoring is voluntary and is supervised by a Laboratory Teaching Assistant and the Biological Sciences 2B Laboratory Coordinator. May be repeated three times for credit. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

### **198. Directed Group Study (1-5)**

(P/NP grading only.)—F, W, S. (F, W, S.)

### **199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

### **Graduate**

#### **210. Molecular Phylogenetic Analysis (3)**

Lecture—2 hours; laboratory—3 hours. Theory and practice of inferring phylogenetic trees using molecular sequence data. Practical techniques for obtaining sequence data, advantages and disadvantages of common approaches for inferring trees, statistical methods for comparing alternative hypotheses. (Same course as Nematology 210.) Offered irregularly.—Nadler

#### **211. Applied Phylogenetics (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 103 or 210 or Population Biology 200C or the equivalent, graduate standing. Applications of phylogenetic methods to fields outside of systematics. Core lectures/labs in remedial phylogenetics, phylogeography, conservation and comparative morphology. Special topics vary yearly. May be repeated one time for credit.—(W.) Moore, Wainwright

#### **220. Species and Speciation (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: course 100, Philosophy 108 or the equivalent; History and Philosophy of Science 130B recommended. Current status of species concepts, models of speciation, current research on speciation, and relevance of species to conservation biology. Offered in alternate years.—W. Shapiro

#### **231. Principles of Biological Data Analysis (3)**

Lecture—2 hours; laboratory—3 hours. Introduction to the principles of data analysis, experimental design, statistical modeling, inference, and hypothesis tests. Statistical methods of particular importance in biological applications will be emphasized. Examples will be presented from the fields of ecology and evolutionary genetics. Offered irregularly. (S/U grading only.)—Rannala

#### **240. Paleobotany and Angiosperm Evolution (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Plant Biology 108, 116, or course 140. Critical analysis of the plant fossil record as a source of evidence on origin, evolution, and phylogeny of the angio-sperms, Cretaceous and Tertiary climates, geographic history of modern taxa, and origin of modern vegetation types. Offered irregularly.

#### **290C. Research Conference (1)**

Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Presentation and discussion of faculty and graduate student research in biology. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

#### **298. Group Study (1-5)**

(S/U grading only.)—F, W, S. (F, W, S.)

#### **299. Research (1-12)**

(S/U grading only.)—F, W, S. (F, W, S.)

### **Professional**

#### **390. Methods of Teaching (2)**

Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Practical experience in the methods and problems of teaching. Includes analyses of texts and supporting material, discussion of teaching techniques and pre-

paring and conducting of laboratory and discussion sections. May be repeated for credit for a maximum of 8 units. (S/U grading only.)—F, W, S. (F, W, S.)

## **Exercise Biology**

**See Neurobiology, Physiology, and Behavior, on page 478.**

## **Family and Community Medicine**

**See Medicine, School of, on page 427.**

## **Feminist Theory and Research**

Wendy Ho, Ph.D., Adviser

**Program Office.** 1219 Hart Hall  
530-752-6429;  
<http://gsws.ucdavis.edu/welcome>

**Graduate Study.** The Gender, Sexuality and Women's Studies Program at UC Davis offers a Designated Emphasis in Feminist Theory & Research. Currently graduate students in the following fourteen affiliated Ph.D. programs are eligible to participate: Anthropology, Comparative Literature, Cultural Studies, Education, English, French, German, Geography, History, Native American Studies, Performance Studies, Psychology, Sociology, Spanish, and the Study of Religion.

The Designated Emphasis in Feminist Theory and Research affords graduate students in affiliated programs the opportunity to augment their Ph.D. in a given discipline with a specialization Feminist Theory and Research. Typically a doctoral student in good standing may seek admission to the Designated Emphasis in Feminist Theory and Research and enroll in Designated Emphasis in Feminist Theory and Research courses. Those students in affiliated Ph.D. programs who complete the requirements of the Designated Emphasis will have this noted on their transcripts and their Ph.D. diploma will note the "Special Emphasis in Feminist Theory & Research."

Students must complete all the requirements for the Ph.D. in their home department. The requirements for the Designated Emphasis in Feminist Theory and Research are the successful completion of the two core courses, Women's Studies 200A and Women's Studies 200B, and two additional courses focusing on gender, sexuality and women's studies; one in the student's home department and one outside their home department. A member of the DE affiliated faculty must be a member of the student's qualifying examination. Analysis of gender or sexuality is expected to be a central component of both the student's qualifying examination and doctoral research.

Students should consult with the Chair of the Designated Emphasis in Feminist Theory and Research before enrolling in a graduate course for which they wish to receive credit to ensure that it will count toward fulfilling the requirements of the Designated Emphasis. If possible, please bring a copy of the syllabus or an expanded course description to your meeting.

**Graduate Adviser.** Wendy Ho in 1219 Hart Hall  
530-752-2-6429; [waho@ucdavis.edu](mailto:waho@ucdavis.edu).

# Fiber and Polymer Science

(College of Agricultural and Environmental Sciences)

**Faculty.** See under *Textiles and Clothing*, on page 567.

## The Major Program

The Fiber and Polymer Science major is concerned with the physical, chemical, and structural properties of fibers and polymers and how these relate to fiber and polymer performance and end-use.

**The Program.** All students in this major take a common core of course work in chemistry, physics, and mathematics, and depth subject matter in fiber and polymer science, organic and physical chemistry, and technical writing. In the restricted electives, students select courses from areas such as computer science and mathematics, chemistry, marketing and management, material and advanced fiber and polymer science, and textiles.

**Career Alternatives.** The major prepares the student for a career in a wide range of industries in the areas of research and development, technical marketing and management, production, quality control, and science teaching (on completion of an additional year in the teaching credential program). The companies employing Fiber and Polymer Science graduates are in the fiber, polymer, industrial product, textile and/or chemical business. Graduates are prepared to enter the graduate program in textiles or agricultural and environmental chemistry with a specialization in fiber and polymer chemistry, fiber and materials science and polymer engineering programs at other universities.

## B.S. Major Requirements:

	UNITS
<b>Preparatory Subject Matter .....</b>	<b>52-55</b>
Chemistry 2A-2B-2C .....	15
Computer Science Engineering 15 or 30...4	
Mathematics 16A-16B-16C or 21A-21B-21C.....	9-12
Physics 7A-7B-7C or 9A-9B-9C .....	12
Statistics 13 or Plant Sciences 120 .....	4
Textiles and Clothing 6 and 8 or	
Engineering 45 .....	8
<b>Depth Subject Matter .....</b>	<b>37-39</b>
Textiles and Clothing 163, 163L .....	4
Fiber and Polymer Science 100, 150, 161, 161L, 180A, 180B.....	14
Chemistry 128A, 128B, 128C, 129A, 129B, 110A and 110C or 107A and 107B .....	19-21
<b>Restricted Electives .....</b>	<b>30</b>

Select courses from the following:

*Computer Science and Mathematics:* Plant Sciences 21; Applied Science Engineering 115, 116; Mathematics 22A, 22B

*Chemistry:* Chemistry 108, 115, 120, 121, 124A, 124B, 124C, 131, 140

*Marketing/Management:* Agricultural and Resource Economics 100A, 100B, 113, 136, 157; Economics 1A, 1B; Statistics 103

*Material and Advanced Fiber/Polymer Science:* Aeronautical Science Engineering 137, Engineering 104, 104L, Textiles and Clothing 250A-F, 290, 293

*Textiles:* Textiles and Clothing 162, 162L, 164, 165, 173, 174

## Total Units for the Degree ..... 119-124

**Major Adviser.** Y. L. Hsieh (*Textiles and Clothing*)

**Advising Center** for the major is located in 1204 RMI south 530-752-3250 or 129B Everson Hall 530-754-8368.

## Minor Program Requirements:

### UNITS

<b>Fiber and Polymer Science .....</b>	<b>18</b>
Textiles and Clothing 6 or Engineering 45 .....	4
Courses selected from the following: Fiber and Polymer Science 100, 150, 161, 161L, 180A and 180B; and Textiles and Clothing 163 and 163L .....	14

**Minor Adviser.** Y. L. Hsieh

## Courses in Fiber and Polymer Science (FPS)

### Upper Division

#### 100. Principles of Polymer Materials Science (3)

Lecture—3 hours. Prerequisite: Chemistry 2A-2B; Chemistry 8A-8B or Engineering 45; introductory physics. The basic principles of polymer science are presented including polymer structure and synthesis; polymerization mechanisms, polymer classes, properties, and reactions; polymer morphology, rheology, and characterization; polymer processing. (Same course as Materials Science Engineering 147.) GE credit: SciEng | QL, SE.—W. (W.) Pan

#### 110. Plastics in Society and the Environment (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 10 or introductory course in physical sciences. Basic concepts and methodologies in the study of plastics. Formation, classification, structure, properties, processing, and formulation. Their application to societal needs, and their impact on society and the environment. GE credit: SciEng or SocSci, Wrt | SE, SL, SS, WE.

#### 150. Polymer Syntheses and Reactions (3)

Lecture—3 hours. Prerequisite: Chemistry 128B or 8B, and Chemistry 107A. Organic and physical chemistry aspects of polymer syntheses and reactions including polymerization mechanisms, kinetics and thermodynamics for major types of organic high polymers. GE credit: SciEng | OL, QL, SE, SL, VL, WE.—S. (S.) Hsieh

#### 161. Structure and Properties of Fibers (3)

Lecture—3 hours. Prerequisite: Textiles and Clothing 6 and Chemistry 8B. The structure, properties and reactions of natural- and man-made fibers; the relations between molecular structure of fibers and their physical properties; interactions of fibers and detergents. GE credit: SciEng | OL, QL, SE, SL, VL, WE.—F. (F.) Hsieh

#### 161L. Textile Chemical Analysis Laboratory (1)

Laboratory—3 hours. Prerequisite: course 161 (may be taken concurrently). Laboratory methods and procedures employed in qualitative and quantitative analysis of textile fibers and auxiliaries. SciEng | GE credit: OL, QL, SE, SL, VL, WE.—F. (F.) Hsieh

#### 180A. Introduction to Research in Fiber and Polymer Science (2)

Laboratory/discussion—6 hours. Prerequisite: senior standing in major related to Fiber and Polymer Science, and consent of instructor. Senior thesis on independent problems. Research begun in course 180A will be continued and completed in course 180B. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | QL, SE, VL, WE.—F, W, S. (F, W, S.)

#### 180B. Introduction to Research in Fiber and Polymer Science (2)

Laboratory/discussion—6 hours. Prerequisite: senior standing in major related to Fiber and Polymer Science, and consent of instructor. Senior thesis on independent problems. Research begun in course 180A will be continued and completed in course 180B. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | QL, SE, VL, WE.—F, W, S. (F, W, S.)

## 192. Internship in Fiber and Polymer Science (1-12)

Internship—3-36 hours. Prerequisite: consent of instructor. Work experience off campus in a fiber and polymer science related area. Supervision by a member of the Textiles and Clothing faculty. (P/NP grading only.)

## 197T. Tutoring in Fiber and Polymer Science (1-5)

Tutorial—3-15 hours. Prerequisite: upper division fiber and polymer science related major and consent of instructor. Tutoring of students in Fiber and Polymer Science courses. Assistance with discussion groups and laboratory sections under supervision of instructor. May be repeated for credit if tutoring in another Fiber and Polymer Science course. (P/NP grading only.)

## 198. Directed Group Study (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

## 199. Special Study for Advanced Undergraduates (1-5)

Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

### Graduate

#### 250A. Special Topics in Polymer and Fiber Science (3)

Lecture—3 hours. Prerequisite: Fiber and Polymer Science 100 or consent of instructor. Selected topics of current interest in polymer and fiber science. Topics will vary each time the course is offered. (Same course as Materials Science and Engineering 250A.)—F, S. (F, S.) Hsieh, Pan, Sun

#### 250B. Special Topics in Polymer and Fiber Science (3)

Lecture—3 hours. Prerequisite: Fiber and Polymer Science 100 or consent of instructor. Selected topics of current interest in polymer and fiber science. Topics will vary each time the course is offered. (Same course as Materials Science and Engineering 250B.)—F, S. (F, S.) Hsieh, Pan, Sun

#### 250C. Special Topics in Polymer and Fiber Science (3)

Lecture—3 hours. Prerequisite: Fiber and Polymer Science 100 or consent of instructor. Selected topics of current interest in polymer and fiber science. Topics will vary each time the course is offered. (Same course as Materials Science and Engineering 250C.)—F, S. (F, S.) Hsieh, Pan, Sun

#### 250D. Special Topics in Polymer and Fiber Science (3)

Lecture—3 hours. Prerequisite: Fiber and Polymer Science 100 or consent of instructor. Selected topics of current interest in polymer and fiber science. Topics will vary each time the course is offered. (Same course as Materials Science and Engineering 250D.)—F, S. (F, S.) Hsieh, Pan, Sun

#### 250E. Special Topics in Polymer and Fiber Science (3)

Lecture—3 hours. Prerequisite: Fiber and Polymer Science 100 or consent of instructor. Selected topics of current interest in polymer and fiber science. Topics will vary each time the course is offered. (Same course as Materials Science and Engineering 250E.)—F, S. (F, S.) Hsieh, Pan, Sun

#### 250F. Special Topics in Polymer and Fiber Science (3)

Lecture—3 hours. Prerequisite: Fiber and Polymer Science 100 or consent of instructor. Selected topics of current interest in polymer and fiber science. Topics will vary each time the course is offered. (Same course as Materials Science and Engineering 250F.)—F, S. (F, S.) Hsieh, Pan, Sun

## 299. Research (1-12)

Independent study—3-36 hours. (S/U grading only.)

### Professional

#### 396. Teaching Assistant Training Practicum (1-4)

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## Film Studies

See Cinema and Digital Media, on page 207.

## First-Year Seminar Program

J. David Furlow, Ph.D., Program Director

**Program Office.** The Grove, Room 1350 (Surge III); <http://fys.ucdavis.edu/>; <http://fys.ucdavis.edu/student/>

### Committee in Charge

Christiana Drake, Ph.D. (*Statistics*)  
James Harding, Ph.D. (*Plant Sciences*)  
Kenneth Hilt, Ph.D. (*Molecular & Cellular Biology*)  
Karma Waltonen, Ph.D. (*University Writing Program*)

### Courses in First-Year Seminar (FRS)

Questions pertaining to the following course should be directed to the instructor or to the First-Year Seminar Office in Undergraduate Education.

#### Lower Division

##### 1. First-Year Seminar (1)

Seminar—1 hour. Open only to: students who have completed fewer than 45 quarter units; transfer students in their first academic year at UC Davis. Investigation of a special topic through shared readings, discussions, written assignments, term papers, and special activities (such as fieldwork, site visits, laboratory work, etc.). Emphasis placed upon student participation in learning. Students may take more than one First-Year Seminar, but may not take more than one in any given quarter. May be repeated for credit if topic differs.—F, W, S. (F, W, S.)

##### 2. First-Year Seminar (2)

Seminar—2 hours. Open only to: students who have completed fewer than 45 quarter units; transfer students in their first academic year at UC Davis. Investigation of a special topic through shared readings, discussions, written assignments, term papers, and special activities (such as fieldwork, site visits, laboratory work, etc.). Emphasis placed upon student participation in learning. Students may take more than one First-Year Seminar, but may not take more than one in any given quarter. May be repeated for credit if topic differs.—F, W, S. (F, W, S.)

##### 3. First-Year Seminar (1)

Seminar—1 hour. Open only to: students who have completed fewer than 45 quarter units; transfer students in their first academic year at UC Davis. Investigation of a special topic through shared readings, discussions, written assignments, term papers, and special activities (such as fieldwork, site visits, laboratory work, etc.). Emphasis placed upon student participation in learning. Students may take more than one First-Year Seminar, but may not take more than one in any given quarter. May be repeated for credit if topic differs. (P/NP grading only.)—F, W, S. (F, W, S.)

##### 4. First-Year Seminar (2)

Seminar—2 hours. Open only to: students who have completed fewer than 45 quarter units; transfer students in their first academic year at UC Davis. Investigation of a special topic through shared readings, discussions, written assignments, term papers, and special activities (such as fieldwork, site visits, laboratory work, etc.). Emphasis placed upon student participation in learning. Students may take more than one First-Year Seminar, but may not take more than one in any given quarter. May be repeated for credit if topic differs. (P/NP grading only.)—F, W, S. (F, W, S.)

## Fisheries

See Animal Science, on page 162; Biological and Agricultural Engineering, on page 191; and Wildlife, Fish, and Conservation Biology, on page 587.

## Food Science

(College of Agricultural and Environmental Sciences)

### The Major Program

Food science is a discipline in which biological, physical, and sensory sciences are integrated for the study of foods to ensure their safety, quality, and healthful properties. The food science curriculum encompasses food chemistry and biochemistry, food safety and microbiology, food processing and preservation, and sensory and consumer sciences.

**Career Alternatives.** Opportunities for employment include positions in the food and allied industries, government agencies, and educational and research institutions. Graduate study for the food science student may lead to the M.S. or Ph.D. degree in food science, or in related fields such as agricultural chemistry, biochemistry, microbiology, and nutrition.

### B.S. Major Requirements:

Preparatory Subject Matter .....	UNITS
<b>61</b>	

University Writing Program 102F, 104A, or 104E .....	4
Communication 1 .....	4
Mathematics 16A-16B-16C .....	9
Biological Sciences 2A .....	5
Chemistry 2A-2B-2C; 8A, 8B (or more advanced series) .....	21
Physics 7A-7B-7C .....	12
Food Science and Technology 50 .....	3
Nutrition 10 (or approved substitute) .....	3

Depth Subject Matter .....	49
----------------------------	----

Biological Sciences 102, 103 .....	6
Statistics 100 .....	4
Microbiology 101 .....	5
Food Science and Technology 100A, 100B, 101A, 101B, 103, 104, 104L, 110, 110L 190 .....	30
Food Science and Technology 117 or Statistics 106 .....	4
Food Science and Technology 127 or 107 .....	4

### Select one of the following two options: Food Science Option

The Food Science option provides a broad exposure to food chemistry, food microbiology and food processing. Students find positions in quality assurance, product development, and food processing in the food industry.

### Restricted Electives for the Food Science option.....18

The restricted electives can:

- (1) Provide a broad exposure to students who would seek positions in quality assurance, product development, and processing in the food industry
- (2) Prepare students for graduate study in food science or related programs,
- (3) Prepare students for professional school in the health sciences. Select courses from a master list, which is available from the advising center for the major.

### Brewing Science Option

The Brewing Science option prepares students for careers in production or quality assurance within the brewing industry or other food fermentation industries (e.g., other alcoholic beverages, vinegar and

cheese). The option also prepares students for graduate study in food science or related programs, and exposes the students to diverse topics, including chemistry, biochemistry, microbiology and processing.

### Specific course requirements ..... 18

Food Science and Technology 102A, 102B, 109, 123 .....

### Selected additional courses ..... 9

Select courses from a master list available from the department Advising Center

### Total Units for the Degree..... 132

**Major Adviser.** A.E. Mitchell (Food Science and Technology)

**Advising Center** for the major is located in 1204 RMI South Building 530-752-3250.

**Graduate Study.** A program of study and research leading to the M.S. and Ph.D. degrees in Food Science is available (see below). For further information on graduate study, contact the graduate adviser.

## Food Science (A Graduate Group)

Gary M. Smith, Ph.D., Chairperson of the Group

**Group Office.** 1204 RMI South Building 530-752-3250; [bftadvising@ucdavis.edu](mailto:bftadvising@ucdavis.edu) <http://www.foodscience.ucdavis.edu>

**Faculty.** Includes members from twelve departments in the Colleges of Agricultural and Environmental Sciences and Engineering, and the Schools of Medicine and Veterinary Medicine.

**Graduate Study.** The interdepartmental Graduate Group in Food Science offers programs of study leading to the M.S. degree and to the Ph.D. degree. Graduate studies stress the application of the biological, chemical, physical, and behavioral sciences to processing, preservation, quality evaluation, public health aspects, and utilization of foods. For the M.S. degree, there are five areas of specialization: chemistry-biochemistry, microbiology, engineering-technology, brewing and sensory science. Individually designed programs are also acceptable. For the Ph.D., there are four areas of emphasis: biochemistry, chemistry, microbiology/fermentation, and sensory science. Detailed information regarding graduate study is available through the Group Chairperson or the Group office.

**Graduate Advisers.** Contact the Food Science Graduate Group office at [bftadvising@ucdavis.edu](mailto:bftadvising@ucdavis.edu).

## Food Science and Technology

(College of Agricultural and Environmental Sciences)

Linda J. Harris, Ph.D., Chairperson of the Department

**Department Office.** 1136 RMI North Building 530-752-1482; <http://foodscience.ucdavis.edu>

### Faculty

Charles W. Bamforth, Ph.D., D.Sc., Distinguished Professor

Daniela Barile, Ph.D., Associate Professor

Diane M. Barrett, Ph.D., Specialist in Cooperative Extension

Charlotte Bilekoff, Ph.D., Associate Professor (*Food Science and Technology, American Studies*)

Gail Bornhorst, Ph.D., Assistant Professor

Stephanie R. Dungan, Ph.D., Professor (*Food Science and Technology, Chemical Engineering and Materials Science*)

J. Bruce German, Ph.D., Professor

Jean-Xavier Guinard, Ph.D., Professor

Maria L. Marco, Ph.D., Associate Professor  
Linda J. Harris, Ph.D., Specialist in Cooperative

Extension

Juliana Leite Nobrega De Moura Bell, Ph.D.,  
Assistant Professor

Bwalya Lungu, Ph.D., Lecturer (*PSOE*)

Michael J. McCarthy, Ph.D., Professor  
(*Food Science and Technology, Biological and Agricultural Engineering*)

David A. Mills, Ph.D., Professor  
(*Food Science and Technology, Viticulture and Enology*)

Alyson Mitchell, Ph.D., Professor

Nitin N. Nitin, Ph.D., Associate Professor  
(*Food Science and Technology, Biological and Agricultural Engineering*)

Michael A. O'Mahony, Ph.D., Professor  
Robert Powell, Ph.D., Distinguished Professor

(*Food Science and Technology, Chemical Engineering and Materials Science*)

Moshe Rosenberg, Ph.D., Professor and Specialist in Cooperative Extension

Christopher Simmons, Ph.D., Assistant Professor

Carolyn L. Slupsky, Ph.D., Professor

(*Food Science and Technology, Nutrition*)

Edward Spang, Ph.D., Assistant Professor

Gary M. Smith, Ph.D., Professor

Ameer Taha, Ph.D., Assistant Professor

Carl Winter, Ph.D., Specialist in Cooperative Extension

Glenn M. Young, Ph.D., Professor

## Emeriti Faculty

Everett Bandman, Ph.D., Professor Emeritus

Ericka L. Barrett, Ph.D., Professor Emerita

John C. Bruhn, Ph.D., Specialist in Cooperative Extension Emeritus

John M. Krochta, Ph.D., Professor Emeritus  
(*Food Science and Technology, Biological and Agricultural Engineering*)

Michael J. Lewis, Ph.D., Professor Emeritus  
*Academic Senate Distinguished Teaching Award*

Kathryn L. McCarthy, Ph.D., Professor Emerita  
(*Food Science and Technology, Biological and Agricultural Engineering*)

R. Larry Merson, Ph.D., Professor Emeritus

David M. Ogrydziak, Ph.D., Professor Emeritus

Chester W. Price, Ph.D., Professor Emeritus

David S. Reid, Ph.D., Professor Emeritus

Gerald F. Russell, Ph.D., Senior Lecturer Emeritus

Barbara O. Schneeman, Ph.D., Professor Emerita  
(*Food Science and Technology, Internal Medicine, Nutrition*)

Howard G. Schutz, Ph.D., Professor Emeritus

Charles F. Shoemaker, Ph.D., Professor Emeritus

R. Paul Singh, Ph.D., Distinguished Professor Emeritus  
(*Food Science and Technology, Biological and Agricultural Engineering*)

**Major Program and Graduate Study.** See the major in *Food Science*, on page 340; and for graduate study, see *Graduate Studies*, on page 120.

**Related Courses.** See courses in Consumer Science, Engineering, Molecular and Cellular Biology, Nutrition, Viticulture and Enology, Environmental Toxicology, Population Health and Reproduction, and Plant Biology.

## Courses in Food Science and Technology (FST)

### Lower Division

#### 1. Principles of Food Science (3)

Lecture—2 hours; discussion—1 hour. Food science fundamentals. Fresh and processed food technologies; world food problems; food composition; food microbiological and toxicological safety; food laws; evaluation of acceptability and nutritional value. Not open for credit to students who have completed any Food Science and Technology course except course 10. GE credit: SciEng | SE, VL.—W. (W.)

#### 3. Introduction to Brewing and Beer (3)

Lecture—3 hours. Basic description of brewing and associated processes, from raw materials to final product; history of brewing and brewing science;

types of beer worldwide; world beer markets; basics of beer quality, including wholesomeness; role of scientist in brewing. GE credit: SciEng | SE, SL.—F, W, S. (F, W, S.) Bamforth

#### 10. Food Science, Folklore and Health (3)

Lecture—3 hours. Ancient and modern food folklore in relation to health and well-being. Food safety, organic food, herbalism, food preservation, and nutritional enhancement. Not open for credit to students who have completed course 2. GE credit: SciEng or SocSci | SE, SL, SS, VL, WC.—F, W, S. (F, W, S.) Smith, Young

#### 50. Introduction to Food Preservation (3)

Lecture—2 hours; laboratory—2 hours. Prerequisite: Chemistry 2A, Biological Sciences 2A, Statistics 100. Restricted to Food Science Majors. Introduction to modes of fresh food preservation including use of chemicals and microbes, heat and energy, control of water and atmosphere, and by indirect approaches such as packaging, hygienic design and sanitation. GE credit: SciEng | QL, SE.—F. (F.) DeMoura Bell

#### 55. Food in American Culture (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: complete Subject A requirement. Relationship between food and culture; relationship between food and the social order; influences on eating habits and the tensions between them including identity, convenience, and responsibility; multiple disciplines and genres. (Same course as American Studies 55.) GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.—S. (S.) Biltkoff

#### 99. Special Study for Undergraduates (1-5) (P/NP grading only.)—F, W, S. (F, W, S.)

### Upper Division

#### 100A. Food Chemistry (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 8B, Biological Sciences 2A recommended. Chemical aspects of food composition. Emphasis on the functional properties and chemical reactions of the major components of foods: carbohydrates, lipids, proteins, and water. GE credit: SciEng | SE, VL.—F. (F.) Dungan

#### 100B. Food Properties (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A, Chemistry 8B; consent of instructor. Sensory quality, chemical and microbial safety, and nutritional properties of foods. Effects of food processing and preparation on these properties.

Selected properties of food commodities. GE credit: SciEng | QL, SE, VL.—W. (W.) German

#### 101A. Food Chemistry Laboratory (2)

Lecture/laboratory—4 hours. Prerequisite: course 100A (must be taken concurrently). Chemical aspects of food composition described in course 100A. GE credit: QL, SE, VL, WE.—F. (F.) Slupsky

#### 101B. Food Properties Laboratory (2)

Lecture/laboratory—1 hour/3 hours. Prerequisite: course 100B (must be taken concurrently). Study of properties of food described in course 100B. GE credit: SciEng | QL, SE, VL, WE.—W. (W.) Barile

#### 102B. Practical Malting and Brewing (4)

Lecture/discussion—2 hours; laboratory—6 hours. Prerequisite: course 102A, Chemistry 2C. Open to seniors only in Fermentation Science or Food Science and Technology. Provides practical working knowledge of analytical methods used in malting and brewing and experience with brewing materials and processes, by analysis of samples that illustrate the range of values experienced in practice and pilot scale brewing. GE credit: SciEng | QL, SE, VL.—W. (W.) Bamforth

#### 103. Physical and Chemical Methods for Food Analysis (4)

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Chemistry 2C and 8B, Biological Sciences 103, course 100B. Theory and application of physical and chemical methods for determining the constituents of foods. Modern separation and instrumental analysis techniques are stressed. GE credit: SciEng | QL, SE, WE.—W. (W.) Mitchell

#### 104. Food Microbiology (3)

Lecture—3 hours. Prerequisite: Biological Sciences 2A, Biological Sciences 103, Microbiology 102, Microbiology 103L. Microorganisms in food safety, spoilage, and production. Food-borne disease agents and their control. Growth parameters of food spoilage agents. Destruction of microbes in food. Food fermentations. The development of microbes as a resource for the food industry. GE credit: SciEng | QL, SE, VL.—W. (W.) Marco

#### 104L. Food Microbiology Laboratory (4)

Lecture—1 hour; discussion—1 hour; laboratory—6 hours. Prerequisite: Biological Sciences 2A and 103. Cultural and morphological characteristics of microorganisms involved in food spoilage, in food-borne disease, and food fermentation. Analysis of microbiological quality of foods. GE credit: SciEng | QL, SE, VL, WE.—S. (S.) Young

#### 107. Food Sensory Science (4)

Lecture—3 hours; laboratory—3 hours. Prerequisite: Statistics 100 or course 117. Critical examination of techniques and theories of sensory measurement of food; measures of consumer perception and acceptance. An introduction to the sensory and cognitive systems associated with the perception of food. Not open for credit to students who have completed course 107A. GE credit: SciEng | QL, SE, WE.—F. (F.) O'Mahony

#### 109. Principles of Quality Assurance in Food Processing (3)

Lecture—2 hours; discussion—1 hour. Prerequisite: Statistics 100. Quality assurance measurement techniques applied to selected food processed products emphasized. Rationale for establishing valid quality assurance programs including selection of samples at critical points. Statistical problems in quality assurance programs used by the food industry. GE credit: SciEng | QL, SE, SL, VL.—S. (S.) O'Mahony

#### 110. Food Processing (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Physics 7A, 7B, 7C or the equivalent; Mathematics 16A, 16B, 16C or the equivalent. Application of the conservation of mass and energy to food processing. Elements of engineering thermodynamics, fluid mechanics, heat and mass transfer. Quantitative analysis through problem solving and simulation. Not open for credit to students enrolled in College of Engineering. GE credit: SciEng | QL, SE, VL.—F. (F.) Simmons

#### 110L. Food Processing Laboratory (2)

Laboratory—3 hours; discussion—1 hour. Prerequisite: course 50, course 110 (must be taken concurrently). Open to Food Science majors only. Laboratory exercises to gain experience with common food processing operations at the bench and pilot plant scales. GE credit: SciEng | QL, SE, SL, VL.—F. (F.) Bornhorst

#### 117. Design and Analysis for Sensory Food Science (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 100. Methods of design and analysis for sensory food science. Experimental design strategies. Use of taste panels and consumer testing. Data analysis and computation including the relative merits and limitations of parametric and nonparametric approaches. Modifications for quality assurance. GE credit: SciEng | QL, SE.—F. (F.) O'Mahony

#### 119. Chemistry and Technology of Milk and Dairy Products (4)

Lecture—4 hours; demonstrations and a field trip. Prerequisite: Biological Sciences 2A; consent of instructor. Composition, structure and properties of milk and products derived from milk. Relates chemical, microbiological, and technological principles to commercial practices in processing of milk and its products. GE credit: SciEng | QL, SE, VL.—S. (S.) Rosenberg

#### 123. Introduction to Enzymology (3)

Lecture—3 hours. Prerequisite: course 123L concurrently. Principles of physical, chemical and catalytic properties of enzymes and their importance. Purification, characterization, and quantitative evaluation of reaction conditions on activity are stressed. Specific

ity and mechanism of action illustrated by use of selected enzymes. [Former course Biochemistry and Biophysics 123.] GE credit: SciEng | QL, SE, VL.—S. (S.) G. Smith

### 123L. Enzymology Laboratory (2)

Lecture—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 103, course 123 (concurrently). Laboratory procedures involved in detection, purification and characterization of enzymes. [Former course Biochemistry and Biophysics 123L.] GE credit: SciEng | QL, SE, VL, WE.—S. (S.) G. Smith

### 127. Sensory Evaluation of Foods (4)

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 117. A critical examination of methods of sensory measurement applied to food and beverage systems; descriptive analysis and consumer tests and their application to quality assurance, product development and optimization. GE credit: SciEng | QL, SE, WE.—W. (W.) Guinard

### 128. Food Toxicology (3)

Lecture—3 hours. Prerequisite: Biological Sciences 102, 103. Chemistry and biochemistry of toxins occurring in foods, including plant and animal toxins, intentional and unintentional food additives. The assessment of food safety and toxic hazards. (Same course as Environmental Toxicology 128.) GE credit: SciEng | SE.—S. (S.) Gaikwad

### 131. Food Packaging (4)

Lecture—3 hours; discussion—1 hour. Prerequisites: Chemistry 8B, Biological Sciences 1B, Physics 7C. Class size limited to 50 students. Principles of food packaging. Functions of packaging. Properties of metal, glass, paper and plastic materials and packages. Design, fabrication, and applications of food packaging. Packaging of fresh and processed foods, including fruits and vegetables, dairy foods, beer and wine. Offered irregularly. GE credit: SciEng | SE.—Su. (Su.)

### 151Y. Food Freezing (1)

Discussion—1 hour; web virtual lecture. Prerequisite: course 110A or the equivalent. Mechanisms of ice crystallization, interpretation of freezing diagrams, and modes of heat transfer. Food properties at sub-freezing temperatures, refrigeration requirements, and estimation of freezing times. Industrial systems used in freezing foods. GE credit: SciEng | QL, SE.

### 159. New Food Product Ideas (3)

Lecture—3 hours. Prerequisite: course 50; Biological Sciences 2A, 2B, 2C; Physics 7A, 7B, 7C and Chemistry 2A, 2B, 2C. Create, refine, test and present viable ideas for new food products. Activities include trend monitoring, consumer research, idea generation, concept screening, and new product concept presentations. GE credit: ArtHum or SocSci | AH or SS, OL, WE.—F. (F.) Biltkekoff

### 160. Food Product Development (4)

Lecture—1 hour; discussion—1 hour; laboratory—6 hours. Prerequisite: courses 50, 103, 104, 110. Product implementation stage of food product development including preliminary product description, prototype development, product testing, and formal presentation of a new product development. GE credit: SciEng | OL, SE, VL.—S. (S.) Lange

### 190. Senior Seminar (1)

Seminar—1 hour. Prerequisite: senior standing or consent of instructor. Selected topics presented by students on recent advances in food science and technology. Reports and discussions concerning oral and written presentations, literature sources and career opportunities. GE credit: SciEng | OL, SE.—S. (S.) Young

### 192. Internship for Advanced Undergraduates (1-12)

Internship—3-36 hours. Prerequisite: consent of instructor. Work experience on or off campus in the practical application of food science. (P/NP grading only.) GE credit: SE.

### 198. Directed Group Study (1-5)

Prerequisite: consent of instructor. (P/NP grading only.) GE credit: SE.

### 199. Special Study for Advanced Undergraduates (1-5)

(P/NP grading only.) GE credit: SE.

### Graduate

#### 201. Food Chemistry and Biochemistry (4)

Lecture—4 hours. Prerequisite: undergraduate courses in organic chemistry and biochemistry; undergraduate course in food chemistry is recommended. Restricted to graduate standing or consent of instructor. Advanced topics in food chemistry and biochemistry, emphasizing the application of the basic principles of chemistry and biochemistry to food composition, properties, preservation and processing. Chemical structures, interactions, reaction mechanisms and experimental methods are stressed.—F. (F.) Barile

#### 202. Chemical and Physical Changes in Food (4)

Lecture—3 hours; term paper. Prerequisite: Biological Sciences 103; Chemistry 107B. Fundamental principles of chemistry and physics are applied to a study of changes in water binding properties and activity, changes in proteins, nutrients, toxic constituents, and other compounds during storage, heating, freezing, dehydrating, and concentrating of food materials.—S. (S.) Dungan

#### 203. Food Processing (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110A, Physics 5C or 7C, Chemistry 107B, or consent of instructor. Principles of food engineering applied to food processing. Relationship of Newtonian and non-Newtonian fluid properties to heat and momentum transfer. Application of mass transfer in controlling kinetics and quality changes of foods.—W. (W.) Nitin

#### 204. Advanced Food Microbiology (3)

Lecture—3 hours. Prerequisite: Biological Sciences 1C, 103, course 104 or a course in microbiology. Principles of and recent developments in food microbiology, including food pathogen virulence and detection, parameters of microbial growth in food, and the microbiology of food and beverage fermentations.—S. (S.) Marco

#### 205. Industrial Microbiology (3)

Lecture—3 hours. Prerequisite: Biological Sciences 1A, 102, 103; Microbiology 130A-130B or Biological Sciences 101 recommended. Use of microorganisms for producing substances such as amino acids, peptides, enzymes, antibiotics and organic acids. Emphasis on metabolic regulation of pathways leading to fermentation products, on yeast fermentations, and on genetic manipulations (including recombinant DNA techniques) of industrial microorganisms.

#### 207. Advanced Sensory-Instrumental Analyses (3)

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 107 and consent of instructor. Basic principles of measurement of color, texture, and flavor of foods by sensory and instrumental methods. Advanced statistical analysis of relation of colorimetry, texturometry, and chemistry of volatile compounds to perception of appearance, texture, flavor.

#### 210. Proteins: Functional Activities and Interactions (3)

Lecture—3 hours. Prerequisite: Biological Sciences 103. The relationships of structure of proteins to their biological functions. Structural proteins, complexing proteins, and catalytic proteins in plant and animal materials and products.

#### 211. Lipids: Chemistry and Nutrition (3)

Lecture—3 hours. Prerequisite: Biological Sciences 103, Chemistry 107B, 128B. Chemistry of lipids as it pertains to research in food and nutrition. Relations between lipid structure and their physical properties in tissues and foods. Regulation of absorption, transport, and metabolism of lipids. Implications of dietary fats and health.—W. (W.) German

#### 213. Flavor Chemistry of Foods and Beverages (3)

Lecture/discussion—3 hours. Prerequisite: Chemistry 8B, Viticulture and Enology 123, Viticulture and Enology 123L or course 103 or consent of instruc-

tors. Students will become familiar with basic principles of flavor chemistry, analysis, and formation in fresh and processed foods. Students will be required to read and critically evaluate flavor chemistry literature. (Same course as Viticulture and Enology 213).—S. (S.) Ebeler, Heymann

#### 217. Advanced Food Sensory Science (3)

Lecture—3 hours. Prerequisite: course 107 (may be taken concurrently) or consent of instructor. Advanced study of the techniques and theory of the sensory measurement of food as an analytical tool and as a measure of consumer perception and acceptance. Advanced examination of the sensory and cognitive systems associated with the perception of food.—F. (F.) O'Mahony

#### 219. Biochemistry, Microbiology and Technology of Cheeses of the World (4)

Lecture—4 hours. Prerequisite: course 119 and Biological Sciences 103 or course 100A, 123, Biological Sciences 103, Chemistry 107B, 128B or consent of instructor. Restricted to graduate level students or senior undergraduate students with appropriate background in biochemistry and microbiology. Compositional and physico-chemical aspects of milk and their implications on cheesemaking; enzymatic, microbiological and physical aspects of cheesemaking; cheese as a biological composite; designing cheese quality attributes; cheese aging. Cheese from all over the world will be tasted and discussed. Offered in alternate years.—(S.) Rosenberg

#### 227. Food Perception and the Chemical Senses (2)

Lecture—2 hours. Prerequisite: course 107B (may be taken concurrently), or consent of instructor. Examination of the anatomy and physiology of the chemical senses (taste, smell, and the trigeminal sense) and how they are involved in the perception of food and food intake.—W. Guinard

#### 290. Seminar (1)

Seminar—1 hour. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

#### 290C. Advanced Research Conference (1)

Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Critical presentation and evaluation of original research by graduate students. Planning of research programs and proposals. Discussion led by individual major instructors for their research group. (S/U grading only.)—F, W, S. (F, W, S.)

#### 291. Advanced Food Science Seminar (1)

Seminar—1 hour. Prerequisite: completion of at least one quarter of course 290. Oral presentation of student's original research, discussion, and critical evaluation. (S/U grading only.)—S. (S.)

#### 298. Group Study (1-5)

(S/U grading only.)

#### 299. Research (1-12)

Prerequisite: graduate standing. (S/U grading only.)

### Professional

#### 396. Teaching Assistant Training Practicum (1-4)

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## Food Service Management

(College of Agricultural and Environmental Sciences)

**Faculty.** See under the Department of [Nutrition](#), on page 490.

### The Major Program and Graduate Study.

Food Service Management is incorporated within the major of Clinical Nutrition. If you are interested in preparing for a career in commercial organizations such as hotels, restaurants, industrial cafeterias, or contract food services, as well as in public or private institutions such as hospitals, correctional institutions, schools, or colleges, consult the Department of Nutrition.

**Related Courses.** See Nutrition.

## Courses in Food Service Management (FSM)

Questions pertaining to the following courses should be directed to the instructor or to the Nutrition Department Advising office in 3202 Meyer Hall 530-752-2512.

### Upper Division

#### 120. Principles of Quantity Food Production (4)

Lecture—3 hours; independent study—1 hour. Prerequisite: Food Science and Technology 100B and 101B. Restricted to upper division Clinical Nutrition students only. Fundamental principles of food service management, including quantity food preparation, institutional equipment, receiving and storage, service, menu planning, merchandising, and safety. Students will earn food safety certification.—S. (S.) Frank

#### 120L. Quantity Food Production Laboratory (2)

Laboratory—6 hours. Prerequisite: course 120. Laboratory experience in quantity food production and service.—F, S. (F, S.) Frank

#### 122. Food Service Systems Management (3)

Lecture—3 hours. Prerequisite: Agricultural and Resource Economics 112, course 120. Principles of quantity food production management: production schedules, portion control, financial management, layout and equipment planning, evaluation of alternative systems, and computer applications.—W. (W.) Frank

#### 192. Internship (1-12)

Internship—3-36 hours. Prerequisite: one upper division course in Food Service Management and consent of instructor. Work experience on or off campus in practical aspects of food service management, supervised by a faculty member. (P/NP grading only.)—Steinberg

#### 197T. Tutoring in Food Service Management (1-2)

Discussion/laboratory—3 or 6 hours. Prerequisite: Dietetics or related major; completion of the Food Service Management course in which tutoring is done. Tutoring of students in food service management, assistance with discussion groups or laboratory sections; weekly conference with instructor in charge of course; written evaluations. May be repeated if tutoring a different course. (P/NP grading only.)—Steinberg

#### 198. Directed Group Study (1-5)

(P/NP grading only.)—Steinberg

#### 199. Special Study for Advanced Undergraduates (1-5)

(P/NP grading only.)—Steinberg

## Forensic Science (A Graduate Group)

Robert H. Rice, Ph.D., Chairperson of the Group

**Group Office.** 1909 Galileo Ct., Suite B  
Davis, CA 95618; 530-747-3922;  
<http://forensicscience.ucdavis.edu>

### Faculty

Faculty members are listed on the website.

**Graduate Study.** The Forensic Science Graduate Group offers the degree of MS in Forensic Science. This program, offering a Plan I-Thesis option, has two tracks, DNA or Criminalistics, enabling the student to take core courses emphasizing the physical or biological sciences. Each track requires the student to take eight to nine core courses, totaling 24-27 units, three units of seminar, and the appropriate number of elective/research units for a total of 54 units. Students can take courses outside their specializations, but they must complete the courses required

for their own track. The FOR seminar course in the fall quarter is required for new students. The FOR spring seminar can be taken in any spring quarter before graduation. Students must also take one additional seminar course in another department or program.

**Preparation.** Appropriate preparation is an undergraduate degree in physical or natural sciences, engineering or a closely related field with a GPA of 3.000 or higher. Examples include Biochemistry, Chemistry, Molecular Biology, Biology, Genetics, and Engineering. Applicants must have completed at least one year each of general chemistry, organic chemistry, general physics, math through calculus and a class in statistics. Other recommended courses include general biology, biochemistry and genetics.

**Graduate Advisers.** Cassandra Calloway (*Forensic Science Graduate Program; Environmental Toxicology*), You-Lo Hsieh (*Division of Textiles and Clothing*), Christopher J. Hopkins (*Forensic Science Graduate Program*), Robert B. Kimsey (*Entomology*), Donald Land (*Chemistry*), Terence Murphy (*Plant Biology*), Ben Sacks (*Population Health & Reproduction/Canid Diversity and Conservation Laboratory-Center for Veterinary Genetics*), Bahram Ravani (*Mechanical & Aeronautical Engineering*), Moshe Rosenberg (*Food Science and Technology*), Matt Wood (*Environmental Toxicology*)

## Courses in Forensic Science (FOR) Graduate

#### 200. Fundamental Concepts in Forensic Science (3)

Lecture—2 hours; fieldwork—0.25 hours; lecture/laboratory—0.25 hours; seminar—0.5 hours. Overview of forensic science. Problem definition, strategies for problem solving, analytical tools, and professional and ethical considerations.—F. (F.) Sensabaugh

#### 205. Microscopy and Microanalytical Methods in Forensic Science (3)

Lecture—2 hours; laboratory—1 hours. Prerequisite: consent of instructor. Restricted to students enrolled in the M.S. in Forensic Science Program; a minimum, year each of the following chemistry, organic chemistry, calculus, & physics. Introduction to optical and electron microscopy. Transmission, diffraction, reflection and absorption; polarized light and polarizing crystals; phase contrast. Radiography; image recording, SEM analysis of gunshot residues, paints, glass. EDS, XRF analysis, signal-to-noise ratios, minimum detectable levels and homogeneity. Offered in alternate years.—(S.) van Benthem

#### 207. Advanced Spectroscopy Methods in Forensic Science (3)

Lecture—3 hours. Restricted to Forensic Science Graduate program or consent of instructor. Discuss, evaluate and interpret advanced molecular spectra/structure, Infrared Spectroscopy, such as chemical applications of spectroscopic methods; vibrational, rotational spectra; electronic spectra, photoelectron spectroscopy generated by various analytical instruments used in forensic science community. Offered in alternate years.—F. (F.) Wood

#### 210. Personal Identification Methods in Forensic Science (3)

Lecture—3 hours. Prerequisite: restricted to students enrolled in the M.S. Forensic Science Program or consent of instructor. Methods for identifying individuals from evidence collected at crime scenes, suspects or victims, crime scene examination and analytical methods used to support such investigations. Topics include forensic anthropology and odontology; latent prints; shoe prints; facial reconstruction/recognition; eyewitness identifications; biometric systems.—S. (S.) Hopkins

#### 212. Scientific Evidence and Courtroom Testimony (3)

Lecture—2 hours; discussion—1 hour. Prerequisite: graduate students enrolled in the MS Forensic Science program or by consent of instructor. Explores the relationship between science and the criminal justice system. Admissibility of scientific testimony

and documentary proof during the trial, concepts of relevancy, hearsay and opinion rule, examination of expert witnesses, impact of Kelley-Fry and Daubert decisions & court testimony.—W. (W.) Chamberlain, Maucieri

#### 215. Forensic Fire and Arson Investigation (3)

Lecture—3 hours. Prerequisite: open only to students enrolled in the M.S. Forensic Science program or by consent of the Forensic Science Program Director. Principles and techniques of scientific investigation of fires and related crimes; offer peer-reviewed protocols for processing fire and explosion scenes; discuss recognition, collection, analysis of physical evidence, and describe the scientific method for decision-making in fire/arson investigation. Offered in alternate years.—(S.) DeHaan

#### 218. Technical Writing in Forensic Science (3)

Lecture—2 hours; extensive writing or discussion—1 hour. Prerequisite: consent of the instructor required for all students not enrolled in the Forensic Science program. Restricted to graduate standing in the Forensic Science program. How to write clear, credible forensic science reports and scientific articles, that (a) serve the ends of the justice system, (b) meet their readers' varying needs and (c) reflect well on the author.—F, S. (F, S.) Neumann

#### 220. Analysis of Toxicants (3)

Lecture—3 hours. Prerequisite: coursework in organic chemistry. Principles of microanalysis of toxicants. Theoretical considerations regarding separation, detection and quantitative determination of toxicants using chemical and instrumental techniques. (Same course as Environmental Toxicology 220).—F. (F.) Zhang

#### 221L. Forensic Science Analytical Instrumentation (2)

Lecture/discussion—1 hour; laboratory—3 hours. Methodology and instruments used for the analysis of substances of interest in the discipline of Forensic Science. Practical experience with modern instrumental techniques & methodologies used in the advanced forensic science laboratory. Limited to students accepted in the Forensic Science Graduate program or subject to the approval of the instructor if the student has the appropriate chemistry, calculus and physics courses required of students in the graduate forensic science program.—F. (F.) Land

#### 240. Homicide Crime Scene Investigation (3)

Lecture—2 hours; laboratory—3 hours. Restricted to Forensic Science Masters Program Students; enrollment is limited to 15 students per class. Processing and evaluating complex homicide scenes. Functions and activities of police agencies. Recognition, documentation, identification, and collection of evidence. Event sequence reconstruction. Evidence collection, preservation, report writing. Courtroom presentation.—F, S. (F, S.) Hopkins

#### 263. Forensic Computer Science Investigations (3)

Lecture—3 hours. Prerequisite: graduate student; consent of instructor. Restricted to students in the Forensic Science Graduate program unless approved by instructor. Discuss the threats to the security of any kind of evidence that is captured, transmitted, or stored digitally and develop critical thinking and basic knowledge of computer forensic science issues in the evaluation of digital evidence.—S. (S.)

#### 268. Statistics in Forensic Science (3)

Lecture—3 hours. Prerequisite: consent of instructor. Restricted to students enrolled in the M.S. in Forensic Science Program or by consent of Forensic Science Program Director. Statistics that are used by the forensic scientist, their limitations/applications in presenting evidential results in such areas as DNA-STR results, trace evidence correlation, fingerprint statistics, population sampling and the Bayes method. Offered in alternate years.—W. (W.)

### **277. Forensic Genetics; Next Generation Techniques and Applications (3)**

Lecture—3 hours. Prerequisite: undergraduate courses in fundamental and applied principles of genetics, biochemistry, and molecular biology, or consent of instructor. Restricted to Forensic Science Graduate students (GFOR) or consent of instructor. Review organization/function of the human genome, recent developments, next generation sequencing techniques including the preparation of DNA samples, principles of the new generation sequencing assay formats and biochemical reactions. Will include quality control parameter, and bioinformatic approaches. Offered in alternate years.—F.

### **278. Molecular Techniques (3)**

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Recombinant DNA technology and its applications. (Same course as Environmental Toxicology 278.) Offered in alternate years.—F. Denison, Rice

### **280. Forensic DNA Analysis (3)**

Lecture—3 hours. Prerequisite: coursework in genetics and molecular biology. Graduate standing; consent of instructor required for all students not enrolled in the MS Forensics program. Foundation in theory and practice of forensic DNA analysis; past, present, and emerging technologies; legal and quality assurance issues. DNA extraction, DNA quantitation, multiplex amplification of STR loci, capillary electrophoresis of amplified products, and analysis of STR typing data. (Same course as Environmental Toxicology 280.)—W. (W.) Von Beroldingen

### **281. Principles and Practice of Forensic Serology and DNA Analysis (3)**

Lecture—2 hours; lecture/discussion—3 hours. Prerequisite: course/Environmental Toxicology 278 or course/Environmental Toxicology 280, or equivalent; consent of instructor. Restricted to students enrolled in the M.S. in Forensic Science Program or by consent of Forensic Science Program Director. Comprehensive overview of forensic serology and DNA typing techniques and technologies. Strong emphasis on real-world applications, including preservation and tracking of biological evidence, detection and identification of bodily fluids, and methods to extract, quantify, and type human DNA. (Same course as Environmental Toxicology 281.)—S. (S.) Rodzen

### **283. Forensic Biology (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: consent of instructor. Restricted to students enrolled in the M.S. in Forensic Science program or by consent of the Forensic Science Program Director. Overview of the foundational concepts in forensic biology: chemistry and molecular biology of biological evidence, genetic basis of biological uniqueness, evolutionary basis of species differences, patterns and dynamics of evidence deterioration, and the legal/professional considerations associated with biological evidence.—W. (W.) Sensabaugh

### **284. Non-Human Forensic DNA—Theory and Casework Application (2)**

Lecture—2 hours. Prerequisite: consent of instructor required for all students not enrolled in the MS Forensics program; upper division Molecular Biology and Genetics or its equivalent. Restricted to graduate standing. Provides a comprehensive understanding of plant and animal forensic biology in terms of sample collection, preservation, analytical methods, and of the invaluable lines of inquiry these forensic evidence may permit. (Same course as Environmental Toxicology 284.) Offered in alternate years.—F.

### **289. Survey in Forensic Science (3)**

Lecture—3 hours. Restricted to students enrolled in the M.S. in Forensic Science Program. Analytical methods in contemporary forensic science. Clandestine laboratories in California, crime scene management, examination and analysis of human hair, forensic ballistics/trajectory reconstruction, shoe/tire print impressions, serial number restoration, forensic aspects of alcohol impairment, bloodstain pattern

interpretation, microscopy of building materials, biological aspect of forensic science. May be repeated for credit when topic differs.—W. (W.) Hopkins

### **290. Seminar in Forensic Science (1)**

Seminar—3 hours. Students will be exposed to topical areas in Forensic Science by presentations conducted by expert guest speakers. The seminar will also serve as a medium whereby the exiting students will present the research conducted as part of their thesis requirement. May be repeated for credit when topic differs. Restricted to students enrolled in the M.S. in Forensic Science Program. (S/U grading only.)—F, S. (F, S.) Hopkins

### **290C. Graduate Research Conference in Forensic Science (1)**

Independent study—1 hour. Restricted to students enrolled in the M.S. in Forensic Science Program. Individual and/or group conference on problems, progress and techniques in forensic science and research. May be repeated for credit when topic differs. Offered irregularly. (S/U grading only.)—F, W, S. (F, W, S.) Hopkins

### **293. Forensic Science Research Methodology (2)**

Lecture—1.5 hour; extensive writing or discussion—0.5 hours. Restricted to students enrolled in the Graduate Forensic Science program or by consent of the instructor. Introduction to identification, formulation, and solution of meaningful scientific problems encountered in the Forensic Science area including experimental design and/or theoretical analysis of new and prevailing techniques, theories and hypotheses. Students will present and defend their thesis research/journal article proposals. (S/U grading only.)—W. (W.) Kimsey

### **298. Group Study in Forensic Science (1-5)**

Restricted to students enrolled in the M.S. in Forensic Science Program. May be repeated for credit when topic differs. Offered irregularly. (S/U grading only.)—F, W, S. (F, W, S.)

### **299. Research in Forensic Science (1-12)**

Prerequisite: consent of instructor. Restricted to students enrolled in the M.S. in Forensic Science Program. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## **French**

(College of Letters and Science)

Noah Guynn, Ph.D., Chairperson of the Department

**Department Office.** 213 Sproul Hall  
530-752-1219; <http://french.ucdavis.edu>

### **Faculty**

Jeff Fort, Ph.D., Associate Professor  
Claire Goldstein, Ph.D., Associate Professor  
Noah Guynn, Ph.D., Associate Professor  
Eric Russell, Ph.D., Associate Professor  
Julia Simon, Ph.D., Professor  
Toby Warner, Ph.D., Assistant Professor

### **Emeriti Faculty**

Claude Abraham, Ph.D., Professor Emeritus  
Edward M. Bloomberg, Ph.D., Professor Emeritus  
Simone Clay, Ph.D., Lecturer Emerita  
Gerald Herman, Ph.D., Senior Lecturer Emeritus  
Margo R. Kaufman, M.A., Senior Lecturer Emerita  
Manfred Kusch, Ph.D., Senior Lecturer Emeritus  
*(Comparative Literature, French and Italian)*  
Marshall Lindsay, Ph.D., Professor Emeritus  
Maria I. Manoliu, Ph.D., Professor Emerita  
Michèle Praeger, Ph.D., Professor Emerita  
Leslie Rabine, Ph.D., Professor Emerita  
*(French, Italian, Women and Gender Studies)*  
Ruth B. York, Ph.D., Senior Lecturer Emerita

### **The Major Program**

The major program assures proficiency in all four of the language skills—speaking, understanding, reading, and writing—and acquaints students with the intellectual and cultural contributions of the French-

speaking world through the study of its literature, traditions, and institutions.

**The Program.** The department encourages its students to work closely with the academic adviser in designing a major tailored to their needs and interests within the broad requirements prescribed by the program and to avail themselves of the guidance of an excellent teaching faculty. Each year, a substantial number of students with good preparation in French participate in the university's very popular Education Abroad Program, which maintains centers in Bordeaux, Lyon, and Paris.

**Career Alternatives.** Foreign language teachers, a cardiologist, a veterinarian, a naval commander at the Pentagon, a professor of Political Science, lawyers, sales representatives, journalists, a speech pathologist, a law professor, translators, a senior applications programmer, travel agents, independent business owners, a senior museum curator, nurses, financial managers, stock brokers, and an industrial attaché for a French Trade Commission—all graduated with an A.B. in French from UC Davis. These represent only a small fraction of the career choices documented in a survey of department graduates.

### **A.B. Major Requirements:**

	UNITS
<b>Preparatory Subject Matter .....</b>	<b>4-34</b>
French 1, 2, 3 (or the equivalent) .....	0-15
French 21, 22, 23 (or the equivalent) .....	0-15
Linguistics 1 or 4 .....	4
<b>Depth Subject Matter .....</b>	<b>44</b>
French 100 .....	4
Three French literature courses from among the following (at least one course must cover pre-revolutionary literature; such courses are marked with an asterisk): 101, 102, 103, *115, *116, *117A, *117B, *118A, *118B, 119A, 119B, 119C, 120, 121, 124, 125, 130, 140, 141 .....	12
Two French culture courses from among the following: 107, 108, 127, 128 .....	8
Two French linguistics and language science courses from among the following: 105, 109, 160, 161, 162 .....	8
Elective courses in French literature, language, or culture, to be chosen in consultation with an undergraduate adviser from among the following: 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 115, 116, 117A, 117B, 118A, 118B, 119A, 119B, 119C, 120, 121, 124, 125, 130, 140, 141 .....	12
<b>Total Units for the Major.....</b>	<b>48-78</b>

**Major Adviser.** T. Warner

### **Minor Program Requirements:**

	UNITS
<b>French.....</b>	<b>24</b>
French 100 .....	4
One French literature course from among the following: 101, 102, 103, 115, 116, 117A, 117B, 118A, 118B, 119A, 119B, 119C, 120, 121, 124, 125, 130, 140, 141 .....	4
One French culture course from among the following: 107, 108, 127, 128 .....	4
One French linguistics and language science course from among the following: 105, 109, 160, 161, 162 .....	4
Two elective courses in French literature, language, or culture from among the following: 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 115, 116, 117A, 117B, 118A, 118B, 119A, 119B, 119C, 120, 121, 124, 125, 127, 128, 130, 133, 140, 141, 160, 161, 162 .....	8

**Honors Program.** Candidates for high or highest honors in French must write a senior thesis under the direction of a faculty member. For this purpose, honors candidates must enroll in French 194H (4 units) and French 195H (4 units). Normally, a student will

undertake the honors project during the first two quarters of the senior year; other arrangements must be authorized by the department chair. Only students who, at the end of the junior year (135 units), have attained a cumulative grade-point average of 3.500 in courses required for the major will be eligible for the honors program. The requirements for earning high and highest honors in French are in addition to the regular requirements for the major in French.

**Education Abroad Program.** The department of French and Italian encourages students to study abroad in the Education Abroad program. With the approval of a major adviser, applicable courses taken abroad may be accepted in the major or minor programs.

**Graduate Study.** The department offers programs of study and research leading to the M.A. and Ph.D. degrees in French. Candidates for the Ph.D. have the option of enriching their degree program by preparing a designated emphasis in African American and African Studies, Classics and Classical Receptions, Critical Theory, Feminist Theory and Research, Second Language Acquisition, and/or Studies in Performance and Practice. Detailed information may be obtained from the graduate adviser or the department chairperson.

**Graduate Adviser.** C. Goldstein

**Prerequisite Credit.** Credit will not normally be given for a course if it is the prerequisite of a course already successfully completed. Exceptions can be made by the department chairperson only.

### Courses in French (FRE)

Students offering high school language preparation as a prerequisite must take a placement test.

**Course Placement.** Students with two years of high school French normally take French 2, those with three years take French 3, and those with four years take French 21.

### Lower Division

#### 1. Elementary French (5)

Discussion—5 hours; laboratory—1 hour. Introduction to French grammar and development of all language skills in a cultural context with special emphasis on communication. Not open for credit to students who have taken course 1A; students who have successfully completed French 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only, although a passing grade will be charged to the student's P/NP option, no petition is required; all other students will receive a letter grade unless a P/NP petition is filed. GE credit: ArtHum | AH, WC.—F, W, S, Su. (F, W, S, Su.)

#### 1A. Accelerated Intensive Elementary French (15)

Lecture/discussion—15 hours. Prerequisite: placement exam required. Introduction to French grammar and development of all language skills in a cultural context with special emphasis on communication. Special 12-week, accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Not open for credit to students who have completed course 1, 1S, 2, 2S, 3, or 3S. GE credit: ArtHum | AH, WC.—Su. (Su.)

#### 1S. Elementary French (5)

Discussion—5 hours; laboratory—1 hour. Introduction to French grammar and development of all language skills in a cultural context with special emphasis on communication. Course is taught abroad. Students who have successfully completed French 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed. Not open for credit to students who have completed course 1 or 1A. GE credit: ArtHum | AH, WC.

#### 2. Elementary French (5)

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1. Not open for credit to students who have taken course 1A. GE credit: ArtHum | AH, WC.—F, W, S, Su. (F, W, S, Su.)

#### 2S. Elementary French (5)

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1 or 1S. Continuation of course 1. Course is taught abroad. Not open for credit to students who have completed course 1A or 2. GE credit: ArtHum | AH, WC.

#### 3. Elementary French (5)

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Continuation of course 2. Not open for credit to students who have taken course 1A. GE credit: ArtHum | AH, WC.—F, W, S. (F, W, S.)

#### 3S. Elementary French (5)

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2 or 2S. Not open for credit to students who have taken course 1A. Continuation of course 2. Course is taught abroad. Not open for credit to students who have completed course 1A or 3. GE credit: ArtHum | AH, WC.

#### 21. Intermediate French (5)

Lecture/discussion—4 hours; laboratory—1 hour. Prerequisite: course 1A, 3, or 3S. Review of grammar and vocabulary acquired in the elementary sequence, as well as the study of new grammatical structures and a continuing enrichment of vocabulary through oral work in class, written exercises, readings and compositions. Not open for credit to students who have completed course 21S. GE credit: ArtHum | AH, OL, WC, WE.—F, W, S. (F, W, S.)

#### 21S. Intermediate French (5)

Lecture/discussion—4 hours; laboratory—1 hour. Prerequisite: course 1A, 3, or 3S. Review of grammar and vocabulary acquired in the elementary sequence, as well as the study of new grammatical structures and a continuing enrichment of vocabulary through oral work in class, written exercises, readings and compositions. Not open for credit to students who have completed course 21. GE credit: ArtHum | AH, OL, WC, WE.

#### 22. Intermediate French (5)

Lecture/discussion—4 hours; laboratory—1 hour. Prerequisite: course 21 or 21S. Continuation of course 21 or 21S. Review of grammar and vocabulary, as well as the study of new grammatical structures and a continuing enrichment of vocabulary. Not open for credit to students who have completed course 22S. GE credit: ArtHum | AH, OL, WC, WE.—F, W, S. (F, W, S.)

#### 22S. Intermediate French (5)

Lecture/discussion—4 hours; laboratory—1 hour. Prerequisite: course 21 or 21S. Continuation of course 21 or 21S. Review of grammar and vocabulary, as well as, the study of new grammatical structures and a continuing enrichment of vocabulary. Not open for credit to students who have completed course 22. GE credit: ArtHum | AH, OL, WC, WE.

#### 23. Intermediate French (5)

Lecture/discussion—4 hours; laboratory—1 hour. Prerequisite: course 22 or 22S. Continuation of course 22 or 22S. Review of grammar and vocabulary, as well as the study of new grammatical structures and a continuing enrichment of vocabulary. Not open for credit to students who have completed course 23S. GE credit: ArtHum | AH, OL, WC, WE.—F, W, S. (F, W, S.)

#### 23S. Intermediate French (5)

Lecture/discussion—4 hours; laboratory—1 hour. Prerequisite: course 22 or 22S. Continuation of course 22 or 22S. Review of grammar and vocabulary, as well as, the study of new grammatical structures and a continuing enrichment of vocabulary. Not open for credit to students who have completed course 23. GE credit: ArtHum | AH, OL, WC, WE.

#### 50. French Film (4)

Lecture—1 hour; discussion—2 hours; term paper. Introduction to the tradition of French cinema from its invention by Méliès and the Lumière brothers through New Wave (especially the works of Truffaut and Godard) and more recent developments in French and Francophone film. Taught in English. Offered in alternate years. GE credit: ArtHum, Wrt | AH, VL, WC, WE.—Fort, Warner

#### 51. Major Works of French Literature in Translation (4)

Lecture—2 hours; discussion—1 hour; term paper. Readings in English translation of key works of French and Francophone literature from the Middle Ages to the present. Particular attention is given to the long-standing interest of French writers in issues of social, regional, gender, sexual, and ethnic identity. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Fort, Guynn

#### 52. France and the French-Speaking World (4)

Lecture—2 hours; discussion—1 hour; term paper. Taught in English. A survey of the history and culture of France and the French-speaking world, especially Canada, the Caribbean and Africa. Study of social, historical and cultural issues that occupy the French-speaking world, with particular attention to mass media. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Simon

#### 53. French as a World Language (4)

Lecture/discussion—3 hours; term paper. The linguistic status of French and its function in multilingual societies and international arenas. Linguistico-political landscape of communities in Euroasia, Africa, and the Americas. Sociolinguistic concepts and emergence of French as a world language. GE credit: ArtHum or SocSci, Div, Wrt | AH, OL, WC, WE.—Russell

#### 98. Directed Group Study (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

#### 99. Special Study for Undergraduates (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division

Course 100 is the prerequisite for the majority of the upper division literature courses.

#### 100. Composition in French (4)

Lecture—3 hours; term paper. Prerequisite: course 23. Instruction and practice in expository writing in French, with emphasis on organization, correct syntax, and vocabulary building. GE credit: ArtHum | AH, WC, WE.—F, W, S. (F, W, S.) Goldstein, Simon, Warner

#### 101. Introduction to French Poetry (4)

Lecture—3 hours. Prerequisite: course 100 or consent of instructor. Analysis and evaluation of works representing the main types of French poetry. Study of French poetic conventions and versification. GE credit: ArtHum | AH, WC, WE.—Goldstein

#### 102. Introduction to French Drama (4)

Lecture—3 hours. Prerequisite: course 100 or consent of instructor. Analysis and evaluation of plays representing the main types of French drama, with emphasis on dramatic structure and techniques. GE credit: ArtHum | AH, WC, WE.—Guynn

#### 103. Introduction to French Prose (4)

Lecture—3 hours; short papers. Prerequisite: course 100 or consent of instructor. Analysis and evaluation of works representing main types of French prose, with emphasis on narrative structure and techniques. GE credit: ArtHum | WC.—Fort, Simon

#### 104. Translation (4)

Lecture—3 hours; extensive writing. Prerequisite: course 100 or the equivalent. Practice in English-to-French and French-to-English translation using a variety of non-literary materials, illustrating different problems and styles.

**105. Advanced French Grammar (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 23 or the equivalent. Understanding of, and extensive practice with, various grammatical structures in French. Lexical-semantic, morphological, and syntactic analysis. GE credit: WE.

**105S. Advanced French Grammar (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 23 or 23S. Understanding of, and extensive practice with, various grammatical structures in French. Lexical-semantic, morphological, and syntactic analysis. Taught abroad. Not open for credit to students who have taken course 105. GE credit: WE.

**106. French in Business and the Professions (4)**

Lecture—1 hour; discussion—2 hours. Prerequisite: course 100 or consent of instructor. The French language as used in the commercial sphere. Emphasis on proper style and form in letter-writing, and in non-literary composition. Technical terminology in such diverse fields as government and world business. GE credit: WE.

**107. The Making of Modern France (4)**

Lecture—3 hours; term paper. Prerequisite: course 23. Introduction to French culture through a historical approach to topics such as the citizen and the state (politics, justice, social security), the nation and centralization, the rise of public education, colonization, class and social relationships. GE credit: ArtHum | AH, WE.—Goldstein, Simon

**107A. Pre and Early Modern France (4)**

Lecture—3 hours; term paper. Prerequisite: course 23. Introduction to pre- and early modern French culture through a historical approach to topics such as the feudal system, the rise of the monarchy, the Reformation and religious wars. GE credit: ArtHum, Wrt | AH, WC, WE.—Goldstein, Simon

**107B. The Making of Modern France (4)**

Lecture—3 hours; term paper. Prerequisite: course 23. Introduction to French culture through a historical approach to topics such as the absolute monarchy, the role of the parlements, the French revolution, and the political regimes of the nineteenth century. GE credit: ArtHum, Wrt.—Goldstein, Simon

**107S. The Making of Modern France (4)**

Lecture—3 hours; term paper. Prerequisite: course 23 or 23S. Introduction to French culture through a historical approach to topics such as the nation-state, centralization of the monarchy, and the rise of public education, colonization, class and social relationships. Taught abroad. Not open for credit to students who have completed course 107. GE credit: ArtHum, Wrt | AH, WC, WE.

**108. Modern French Culture (4)**

Lecture—3 hours; extensive writing. Prerequisite: course 23. Survey of modern French culture from the Dreyfus affair to the present day. Topics may include women and French culture, decolonialization and modernization, education, social welfare and immigration. GE credit: WC, WE.—Fort, Simon

**109. French Phonetics (4)**

Lecture/discussion—3 hours; laboratory—1 hour. Prerequisite: course 23 or the equivalent. Introduction to the sound-inventory of French and practice in phonetic transcription, with a focus on ways in which phonetic contrasts signal grammatical contrasts; spoken forms and spelling; formal differences between the "Standard" and other varieties across the French-speaking world. GE credit: ArtHum or SocSci | AH or SS.—Russell

**110. Stylistics and Creative Composition (4)**

Lecture—3 hours; frequent papers. Prerequisite: course 100 or consent of instructor. Intensive course in creative composition using a variety of techniques and literary styles, patterned on Queneau's *Exercices de style*. Practice in such stylistic modifications as inversion, antithesis, changes in tense, mood, tonality, etc. The writing of poetry. GE credit: WC.

**115. Medieval French Literature and Society (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Social and cultural life of medieval France as studied through its representation in such literary works as *La Chanson de Roland*, courtly love lyric, the Arthurian romances of Chrétien de Troyes, *Aucassin et Nicolette*, selected fabliaux and farces. GE credit: ArtHum | AH, WC, WE.—Guynn

**116. The French Renaissance (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Overview of major works and writers with particular attention to the historical context of the turbulent 16th century. Writers to be read may include Rabelais, Marot, Ronsard, Du Bellay, Labé, Marguerite de Navarre, Montaigne, and D'Aubigné. GE credit: ArtHum | AH, WC, WE.—Goldstein, Guynn

**117A. Baroque and Preclassicism (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or consent of instructor. The literature and intellectual culture of the period between the Renaissance and French classicism. GE credit: ArtHum | AH, WC, WE.—Goldstein, Guynn

**117B. The Classical Moment (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Literature, culture, and politics in the Age of Louis XIV. May be repeated one time for credit when topic differs. GE credit: ArtHum | AH, WC, WE.—Goldstein, Guynn

**118A. The Age of Reason and Revolution (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100. Literature and philosophy of the French Enlightenment. Readings from such authors as Bayle, Fontenelle, Montesquieu, Voltaire, Rousseau and Diderot. GE credit: ArtHum | AH, OL, WC, WE.—Simon

**118B. Private Lives and Public Secrets: The Early French Novel (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or consent of instructor. History of the French roman from the Middle Ages to the Revolution with particular emphasis on the novels of the 18th century. GE credit: ArtHum | AH, WC, WE.—Simon

**119A. The Romantic Imaginary (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Major concepts and themes of French Romanticism, such as dream and the supernatural, impossible love, exoticism, revolution, individualism, nature, the mal du siècle, Romantic irony, the creative imagination, the cult of ruin. GE credit: ArtHum, Wrt | AH, WC, WE.—Fort, Simon

**119B. Realism, History and the Novel (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Narrative and historical codes of French realist fiction, with emphasis on the representation of history in the realist novel, its depiction of social "realities" such as class and gender, and its relation to the historical situation of post-revolutionary society. GE credit: ArtHum, Wrt | AH, WC, WE.—Fort, Simon

**119C. From Baudelaire to Surrealism (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Study of the main poets and poetic movements from the mid-19th to the early 20th century, including Baudelaire, the Symbolists, and the Surrealists. GE credit: ArtHum | AH, WC, WE.—Fort, Simon

**120. Modern French Thought (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Overview of post-Second World War French intellectual currents from existentialism to structuralism and deconstructionism. Readings will include Sartre and de Beauvoir, Camus, Lévi-Strauss, Lacan, Barthes, Foucault, Derrida, Kristeva, Sollers, Cixous, and Irigaray. Offered in alternate years. GE credit: ArtHum, Wrt | AH, WC, WE.—F. (F.) Fort

**121. Twentieth Century French Novel (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Novels and theories of the novel, from Proust to the Nouveau Roman and beyond. Readings from among Gide, Sartre, de Beauvoir, Camus, Breton, Beckett, Robbe-Grillet, Sarraute, Simon, Barthes, Duras, Tournier, Perec, Modiano, Guibert, Toussaint. GE credit: ArtHum, Wrt | AH, WC, WE.—Fort, Warner

**122. French and Francophone Film (4)**

Lecture/discussion—4 hours; extensive writing; field-work—3 hours. Prerequisite: course 100 or consent of instructor. French and Francophone film from the Lumière Brothers to the present. Topics may include analysis of film form and narrative, major filmmakers and filmic traditions, and film theory. May be repeated one time for credit when topic differs. GE credit: ArtHum | AH, VL, WC, WE.—Fort, Warner

**124. Post-Colonial and Francophone Literature (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Post-Independence Black African and/or Caribbean and/or North African literatures written in French. Selected topics include: identity and subjectivity, the role of the intellectual, women's voices, languages and oral literatures, cultural syncretism, theories of post-colonialism. May be repeated one time for credit with approval of major adviser and instructor; when content differs; for example, students may take the course for repeat credit when the geographical focus (West Africa, North, African or Caribbean) or theme is substantially different from previous iterations. GE credit: ArtHum, Div | AH, WC, WE.—Warner

**125. French Literature and Other Arts (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Relationship between French literature and other arts—painting, music, cinema, architecture, opera—from different periods. May be repeated one time for credit when topic differs. GE credit: ArtHum, Wrt | WC.—Fort, Goldstein, Guynn, Simon

**125S. French Literature and Other Arts (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Relationship between French literature and other arts, such as painting, music, cinema, architecture, or opera, from different periods. Taught abroad. May be repeated one time for credit when topic differs. GE credit: ArtHum, Wrt | AH, VL, WC, WE.

**127. Paris: Modernity and Metropolitan Culture (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Representation of Paris in 19th and 20th century texts and its importance in defining the experience and art of modernity. GE credit: ArtHum, Wrt | AH, WC, WE.—Simon

**128. Topics in French Culture (4)**

Lecture—3 hours; extensive writing. Prerequisite: course 100 or consent of instructor. In-depth study of a particular topic in French culture. Topics may include the Court of Louis XIV, the French Revolution and Immigration. May be repeated one time for credit when topic differs. GE credit: WE.

**128S. Topics in French Culture (4)**

Lecture—3 hours; extensive writing. Prerequisite: course 100 or consent of instructor. In-depth study of a particular topic in French culture. Topics may include the Court of Louis XIV, the French Revolution, and Immigration. Taught abroad. May be repeated one time for credit when topic differs. GE credit: ArtHum | AH, WC, WE.

**130. From Page to Stage: Theatre and Theatricality (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or consent of instructor. French theater as literature and performance. May be repeated one time for credit when topic differs. GE credit: ArtHum, Wrt | AH, WC, WE.—Guynn

**133. Gender and Politics in French Literature and Culture (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Thematic, theoretical and political tendencies in contemporary French fiction. Barthes, Foucault, Duras, Guibert, considered in terms of their writing on identity and gender. GE credit: ArtHum, Div | AH, WC, WE.—Guynn

**140. Study of a Major Writer (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Concentrated study of works of a single author. May be repeated one time for credit if author-subject changes. GE credit: ArtHum | AH, WC, WE.

**141. Selected Topics in French Literature (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Subjects and themes such as satiric and didactic poetry of the Middle Ages, poetry of the Pléiade, theater in the eighteenth century, pre-romantic poetry, autobiography, literature and film, etc. May be repeated two times for credit when topic differs. GE credit: ArtHum | AH, WC, WE.

**141S. Selected Topics in French Literature (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Subjects and themes such as satiric and didactic poetry of the Middle Ages, poetry of the Pléiade, theater in the eighteenth century, pre-romantic poetry, autobiography, literature and film, etc. Taught abroad. May be repeated two times for credit when topic differs. GE credit: ArtHum | AH, WC, WE.

**160. Linguistic Study of French-Sound and Form (4)**

Seminar—3 hours; term paper. Prerequisite: course 100 or Linguistics 1. Introduction to the linguistic study of modern French, with focus on sound structure and form, inflection and derivation. GE credit: ArtHum or SocSci | AH or SS, WE.—W. (W.) Anderson, Russell

**161. Linguistic Study of French—Form and Meaning (4)**

Seminar—3 hours; term paper. Prerequisite: course 100 or Linguistics 1. Introduction to the linguistic study of modern French, with focus on sentence construction and constituency, meaning and discourse functions. GE credit: ArtHum or SocSci | AH or SS.—Russell

**162. History of the French Language (4)**

Lecture—3 hours; term paper. Prerequisite: course 100 or Linguistics 1. Main periods in development of the French language, from Latin to contemporary popular aspects, with emphasis on relationship between socio-cultural patterns and evolution of the language. Offered in alternate years. GE credit: ArtHum or SocSci | AH or SS, WC, WE.—Russell

**192. Internship (1-12)**

Internship—3-36 hours; term paper. Prerequisite: upper division standing and consent of instructor. Practical application of the French language through work experience in government and/or business, culminating in an analytical term paper on a topic approved by the sponsoring instructor. (P/NP grading only.)

**194H. Special Study for Honors Students (4)**

Independent study—4 hours. Prerequisite: open only to French majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in French literature, civilization, or language studies. (P/NP grading only.) GE credit: AH, WC, WE.

**195H. Honors Thesis (4)**

Independent study—4 hours. Prerequisite: course 194H. Writing of an honors thesis on a topic in French literature, civilization, or language studies under the direction of a faculty member. (P/NP grading only.) GE credit: AH, WC, WE.

**197T. Tutoring in French (1-4)**

Seminar—1-2 hours; laboratory—1-2 hours. Prerequisite: upper division standing and consent of Chairperson. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit for a total of 6 units. (P/NP grading only.)

**197TC. Tutoring in the Community (2-4)**

Seminar—1-2 hours; laboratory—1-2 hours. Prerequisite: upper division standing and consent of Chairperson. Tutoring in public schools under the guidance of a regular teacher and supervision by a departmental faculty member. May be repeated for credit for a total of 6 units. (P/NP grading only.)

**198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**198S. Directed Group Study (1-5)**

Group study on focused topics in French literature and culture. May be repeated for credit. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.)

**Graduate****200. Introduction to Graduate Study in French (2)**

Seminar—2 hours. Prerequisite: graduate standing or consent of instructor. Introduction to a range of methodologies and critical practices in the field of French Studies, including literature, culture, and linguistics. Covers basic principles of bibliographic research in the humanities. (S/U grading only.)—F. (F.) Goldstein

**201. History of French (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Presentation of the main changes in the grammatical structures of French, from Latin to contemporary usage, involving textual analysis and sociolinguistic description.—Russell

**202. Topics in French Civilization (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Interdisciplinary approach to the study of French and Francophone civilization from the Middle Ages to the present. Course content will vary by instructor. May be repeated for credit when content differs.—Simon

**204. Topics in Medieval Literature (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of Medieval French literature, focusing on a particular period, milieu, literary movement, genre, or theoretical approach. May be repeated for credit when topic differs.—Guynn

**205A. Sixteenth-Century Literature: The Humanists (4)**

Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. French humanism in its most varied forms. Although at different times Rabelais and Montaigne will be primarily studied, other leading intellectuals and religious writers will also receive attention. May be repeated for credit when different topic is studied.—Goldstein, Guynn

**206A. Seventeenth-Century Literature: Theater (4)**

Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Works of Corneille, Racine, Molière, and minor dramatists. One or more authors may be covered. May be repeated for credit with consent of instructor when different topics are studied.—Goldstein, Guynn

**206B. Seventeenth-Century Literature: Prose (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Works of authors such as Pascal, Descartes, Mme de Lafayette. One or more authors may be covered. May be repeated for credit with consent of instructor as different topics are studied from quarter to quarter.—Goldstein

**206C. Seventeenth-Century Literature:****Poetry (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Studies of the works of one or more poets of the period. May be repeated for credit with consent of instructor.—Goldstein

**207A. Eighteenth-Century Literature: Philosophies (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Not a course in philosophy, but an examination of the role of philosophy in the design and context of literary works. Study of one or more authors. May be repeated for credit.—Simon

**207B. Eighteenth-Century Literature: Novel (4)**

Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Rise of the novel. Study of narrative experiments in the context of the philosophical climate and new literary values. Course may treat one or more novelists of the period. May be repeated for credit when different topics are studied.—Simon

**208A. Nineteenth-Century Literature: Fiction (4)**

Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Study of the works of one or several novelists and/or short-story writers of the period. May be repeated for credit with consent of instructor when different topics are studied.—Simon

**208B. Nineteenth-Century Literature: Poetry (4)**

Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Study of the works of one or several poets of the period. May be repeated for credit with consent of instructor when different topics are studied.—Simon

**209A. Twentieth-Century: Prose (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the works of one or several writers of the period.—Fort, Warner

**209B. Twentieth-Century: Theater (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the works of one or several dramatists of the period. May be repeated for credit with consent of instructor.—Fort, Guynn

**209C. Twentieth-Century: Poetry (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the works of one or several poets of the period. May be repeated for credit with consent of instructor.—Fort, Goldstein

**210. Studies in Narrative Fiction (4)**

Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. May be repeated for credit with consent of instructor when different topic is studied.

**211. Studies in Criticism (4)**

Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. May be repeated for credit with consent of instructor when different topic is studied.

**212. Studies in the Theater (4)**

Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. May be repeated for credit with consent of instructor when different topic is studied.

**213. Studies in Poetry (4)**

Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. May be repeated for credit with consent of instructor when different topic is studied.

**214. Study of a Literary Movement (4)**

Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. May be repeated for credit with consent of instructor when different topic is studied.

**215. Topics in French and Francophone Film (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Aspects of French and Francophone film from the Lumière Brothers through the present. Topics may include a specific historical period of filmmaking, film theories and the analysis of film form and narrative, and major filmmakers and filmic traditions. May be repeated two times for credit.—Fort

**224. Francophone Literatures (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of cultural productions (literature, film, visual arts) by Francophone peoples such as found in North Africa, West Africa, the Caribbean, South-East Asia, the Americas, and Metropolitan France. May be repeated for credit when topic differs and with consent of instructor.—Warner

**250A. French Linguistics I (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Theoretical approach to the forms and functions of French, with emphasis on phonology and morphology. Overview of current linguistic theories and their application to French.—Russell

**250B. French Linguistics II (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Theoretical approach to the forms and functions of French, with emphasis on syntax and semantics. Overview of current linguistic theories and their application to French.—Russell

**251. Topics in the Linguistic Study of French (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Questions relevant to the linguistic study of French, such as language acquisition, sociolinguistics, or theoretical examination of structure. Intended for students in French Linguistics and those applying linguistic models to literature or teaching. May be repeated for credit when topic differs.—Russell

**291. Foreign Language Learning in the Classroom (4)**

Seminar—3 hours; project. Prerequisite: graduate standing or consent of instructor. Overview of approaches to university-level foreign language instruction and the theoretical notions underlying current trends in classroom practices across commonly taught foreign languages. (Same course as German 291 and Spanish 291.)

**297. Individual Study (1-5)**

Prerequisite: graduate standing or consent of instructor. (S/U grading only.)

**298. Group Study (1-5)**

Seminar—1-5 hours. Prerequisite: graduate standing or consent of instructor. May be repeated for credit with consent of instructor.

**299. Research (1-12)**

Prerequisite: graduate standing or consent of instructor. (S/U grading only.)

**299D. Dissertation Research (1-12)**

Prerequisite: graduate standing or consent of instructor. (S/U grading only.)

**Professional****300. Teaching of a Modern Foreign Language (3)**

Lecture/discussion—3 hours. Prerequisite: senior or graduate standing; a major or minor in a modern foreign language.

**390A. The Teaching of French in College (2)**

Lecture/discussion—2 hours. Prerequisite: graduate standing or consent of instructor. Course designed for graduate teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the university. May be repeated for credit with consent of instructor. (S/U grading only.)

**390B. The Teaching of French in College (2)**

Lecture/discussion—2 hours. Prerequisite: graduate standing or consent of instructor. Course designed for graduate teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the university. (S/U grading only.)

**396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## Fungal Biology and Ecology

(College of Agricultural and Environmental Sciences)

The minor in Fungal Biology and Ecology is open to all students interested in a concentrated exposure to and knowledge of the fungi and allied organisms.

The minor is sponsored by the Plant Pathology Department.

**Minor Program Requirements:****Fungal Biology and Ecology ..... 18-20 UNITS**

Plant Pathology 130, 148, 150 .....	10
Select 7-9 units from Food Science and Technology 104, Plant Pathology 40, 135, 185, Science and Society 30, Soil Science 111; Plant Pathology 224 (available to advanced students with consent of instructor) .....	7-9

**Minor Adviser.** T. Gordon

## Gender, Sexuality and Women's Studies

(College of Letters and Science)

Maxine Craig, Ph.D., Program Director

**Program Office.** 1200 Hart Hall  
530-752-6429; <http://gsws.ucdavis.edu/>

**Committee in Charge**

Elizabeth Constable, Ph.D.  
(*Gender, Sexuality and Women's Studies*)  
Maxine Craig, Ph.D.  
(*Gender, Sexuality and Women's Studies*)  
Wendy Ho, Ph.D. (*Asian American Studies; Gender, Sexuality and Women's Studies*)  
Rana Jaleel, Ph.D./J.D., Assistant Professor  
(*Gender, Sexuality and Women's Studies*)  
Suad Joseph, Ph.D. (*Anthropology; Women and Gender Studies*)  
Susan Kaiser, Ph.D. (*Gender, Sexuality and Women's Studies; Textiles and Clothing*)  
Amina Mama, Ph.D. (*Gender, Sexuality and Women's Studies*)  
Kimberly D. Nettles-Barcelón, Ph.D.  
(*Gender, Sexuality and Women's Studies*)

**Faculty**

Elizabeth Constable, Ph.D., Associate Professor  
(*Gender, Sexuality and Women's Studies*)  
Maxine Craig, Ph.D., Associate Professor  
(*Gender, Sexuality and Women's Studies*)  
Wendy Ho, Ph.D., Senior Lecturer (*Asian American Studies; Gender, Sexuality and Women's Studies*)  
Rana Jaleel, Ph.D./J.D., Assistant Professor  
(*Gender, Sexuality and Women's Studies*)  
Suad Joseph, Ph.D., Professor (*Anthropology; Gender, Sexuality and Women's Studies*)  
Susan B. Kaiser, Ph.D., Professor (*Gender, Sexuality and Women's Studies; Textiles and Clothing*)  
Amina Mama, Ph.D., Professor (*Gender, Sexuality and Women's Studies*)  
Kimberly D. Nettles-Barcelón, Ph.D., Associate Professor (*Gender, Sexuality and Women's Studies*)

**Emeriti Faculty**

Anna Kuhn, Ph.D., Professor Emerita  
Judith Newton, Ph.D., Professor Emerita  
Leslie Rabine, Ph.D., Professor Emerita

**The Major Program**

Gender, Sexuality and Women's Studies is an interdisciplinary major founded on the understanding that the social production of gender is inseparable from that of race, sexuality, class, nationality, ability and other categories of difference. Our curriculum places feminist concerns within a transnational context, while respecting the need for geographic and historical specificity. These frameworks inform our teaching, our research, our institutional and community practices, and the principles we bring to our classrooms. Gender, Sexuality and Women's Studies offers a wide range of classes that use the lens of gender to examine colonialism and post colonialism, globalization, history, sexuality, queer theory, literature, popular culture, feminist video production, area studies, film fashion and food. The Program offers both an undergraduate major and minor. We also work collaboratively with other units on campus to sponsor two undergraduate minors, Sexuality Studies and Social and Ethnic Relations, and an undergraduate concentration in transnational production and consumption.

**The Program.** One of the most exciting and challenging aspects of the Gender, Sexuality and Women's Studies Program is that students, in consultation with the peer and faculty advisers, can pursue their particular academic interests and design their course of study accordingly. In devising their major plan, students will draw on courses offered in African American and African Studies, American Studies, Anthropology, Asian American Studies, Chicana/o Studies, Comparative Literature, English, French, German and Italian Studies, History, Linguistics, Native American Studies, Political Science, Psychology, Sociology, Spanish, Textiles and Clothing, and other related disciplines.

In addition to offering a broad array of courses that deal with gender, class, race, ethnicity, and sexuality, the Gender, Sexuality and Women's Studies Program affords interested students the opportunity to earn internship credit and conduct independent research as well as take advantage of the Honors Thesis option.

Students design a program of study in consultation with an adviser that is in accordance with their individual career goals. Many Gender, Sexuality and Women's Studies majors find it advantageous to pursue a double major, or to minor in another field of study. Upon successful completion of the degree requirements, students majoring in the program will graduate with a Bachelor of Arts in Gender, Sexuality and Women's Studies.

**Career Alternatives.** A degree in Gender, Sexuality and Women's Studies opens many possibilities for future employment. The major introduces students to relevant social issues, fosters critical thinking, develops strong verbal, writing and research skills and encourages social advocacy.

Pre-professional students will discover that a major in Gender, Sexuality and Women's Studies offers useful preparatory training for medical or law school. It is particularly suitable for those interested in specializing in social policy, international development, social justice or gender-related work in a wide range of institutions and contexts. Students who plan to do practical work in counseling, clinical psychology, social services, education, media or politics will also find a major in Gender, Sexuality and Women's Studies provides a strong foundation. Those who wish to pursue graduate level research in such fields as anthropology, comparative literature, cultural studies, economics, education, ethnic studies, English, film studies, history, languages and literatures, performance studies, philosophy, political science, and sociology will also benefit from a strong Gender, Sexuality and Women's Studies undergraduate background in critical theory, social analysis,

history and a sound understanding of cultural representation and narratives of difference.

Increasingly, media and cultural institutions, corporations, and personnel firms are hiring specialists in women and gender studies trained in understanding the complex cultural challenges and demands arising from diverse communities. State and federal agencies need people who have special understanding of the problems that diverse groups of women face in society, industry, and the professions. Educational institutions across the spectrum need specialists to develop and administer women and gender studies programs, multi-cultural community centers, LGBTQ organizations and other organizations designed specifically to deal with gender, social diversity and inequality, and a growing range of old and new social challenges arising in the context of globalization.

Some of our alumni have developed careers other than those described above. Gender, Sexuality and Women's Studies faculty and peer advisers can provide even more ideas about possible future careers. Doing internships related to coursework enables students to integrate theory with hands-on practice and service in the community.

## Gender, Sexuality and Women's Studies

### A.B. Major Requirements:

**UNITS**

**Preparatory Subject Matter ..... 20**

Three courses from: Women's Studies, 50, 60, 70 ..... 12  
Two courses selected from: African American and African Studies 10, 17, American Studies 21, 30, Anthropology 2, 20, 30, Asian American Studies 1, 2, Chicana/o Studies 10, 21S, 50, Comparative Literature 12, Dramatic Art 1, English 3, History 72A, 72B, 85, Native American Studies 10, 32, Political Science 7, Psychology 1, Science and Technology 1, 2, 20, 32, Sociology 2, 3, 11, 30A, 30B, Textiles and Clothing 7, Undergraduate Writing Program 19, Women's Studies 20, 80 ..... 8

**Depth Subject Matter ..... 44**

Women's Studies 103, 104, 137, 190 ..... 16  
Histories and Cultures ..... 12  
Choose three courses to meet this requirement. May not duplicate those used to meet other Gender, Sexuality and Women's Studies major requirements. The list that follows represents a partial list of options; other courses may be included with the consent of the Gender, Sexuality and Women's Studies Adviser.  
African American and African Studies 107A, 107C, 123, 133, 181, Anthropology 126B, 130A, 139AN, 139BN, Asian American Studies 112, 150, Chicana/o Studies 111, 122, 131, Comparative Literature 135, 138, 159, Design 143, English 185A, 185B, French 124, German 114, 168, 176A, History 102M, 148A, 148B, 159, 184, 193A, 193B, 193C, Native American Studies 134, 135, 180, Political Science 166, Religious Studies 157, 161, Sociology 131, 134, 145B, 158, 172, Women's Studies 102, 130, 138, 145, 146, 148, 158, 160, 174, 175, 176, 178AF, 180, 182, 184, 185, 187.

Thematic Cluster Tracks ..... 16  
Choose one of three cluster tracks. Choose four courses that form a thematic cluster, at least two of which are Women's Studies courses specified for the track. Courses used to meet this requirement may not duplicate those used to meet other Gender, Sexuality and Women's Studies major requirements. Students may also develop their own thematic or interdisciplinary cluster in consultation with the faculty adviser.

### Track 1: Social Justice, Gender Politics and Activism

Requires two of the following Women's Studies courses: 102, 140, 145, 146, 148, 170, 175, 182, 187, 192, 193.

Requires two depth electives from: African American and African Studies 17, 123, 133, Anthropology 126B, 139BN, Asian American Studies 112, Chicana/o Studies 100, 110, 111, 112, 130, 131, 131S, 182, History 150, 159, 160, Native American Studies 180, Political Science 166, Sociology 133, 158, 172, Science and Technology 129, 150.

### Track 2: Culture, Power, and Resources

Requires two of the follow Women's Studies courses: 136, 138, 139, 148, 160, 162, 164, 165, 176, 178AF, 180, 182, 185.

Requires two depth electives from: African American and African Studies 181, Asian American Studies 141, 150S, Anthropology 126B, 128B, Chicana/o Studies 145, 147, 160, 170, 171, Comparative Literature 159, English 155B, 185A, Film Studies 120, 125, 129, 165, German 114, Linguistics 163, Science and Technology 129, 150, Textiles and Clothing 107.

### Track 3: Sexualities, Subjectivities and Body Politics

Requires Women's Studies 170 and one course from: 130, 136, 138, 158, 160, 174, 175, 176, 187.

Requires two depth electives from: African American and African Studies 123, Asian American Studies 112, Anthropology 139BN, Chicana/o Studies 112, 120, 122, 154, 160, English 166, 186, History 102M, 184, Native American Studies 134, 135, 180, Psychology 158, 159.

### Total units for the major ..... 64

**Major Adviser.** All Gender, Sexuality and Women's Studies majors and minors must consult with a faculty adviser, individually, at least once each academic year.

### Minor Program Requirements:

**UNITS**

**Gender, Sexuality and Women's Studies ..... 24**

Women's Studies 20, 50, 60, 70 or 80 .... 4

Choose one from: African American and African Studies 123, 133, Anthropology 126B, 130A, 139BN, Asian American Studies 112, Chicana/o Studies, 111, 122, 131, Native American Studies 134, 180, Sociology 131, 132, 134, 145B, 158, 172, Women's Studies 160, 180 ..... 4

Choose one from: Anthropology 148B, Comparative Literature 135, 138, 159, English 129, 185A, 185B, History 102G, 102H, 102M, 148A, 148B, Women's Studies 102, 180, 182, 184 ..... 4

Additional Electives from approved list of upper division cross-listed and Women's Studies courses ..... 12

Note: With prior consultation with an adviser, other upper division courses may be accepted toward the minor program. Under no circumstances may more than one lower division course be offered in satisfaction of requirements for the minor.

**Minor Adviser.** All Gender, Sexuality and Women's Studies majors and minors must consult with a faculty adviser, individually, at least once each academic year.

**Graduate Study.** The Gender, Sexuality and Women's Studies Program offers a designated emphasis in Feminist Theory and Research for students enrolled in the Ph.D. programs of fifteen other affiliated departments.

## Courses in Women's Studies (WMS)

### Lower Division

#### 20. Cultural Representations of Gender (4)

Lecture/discussion—4 hours. Interdisciplinary investigation of how specific cultures represent gender difference. Examine a variety of cultural forms and phenomena including film, television, literature, music, popular movements, and institutions. Offered irregularly. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, VL, WC, WE.

#### 25. Gender and Global Cinema (4)

Lecture—3 hours; film viewing—3 hours. The role gender plays in film history/culture in various geographical contexts and in aspects of contemporary globalization. Films from nations such as China, Colombia, Cuba, Ethiopia, India, Iran, Korea, New Zealand, and the U.S. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.

#### 50. Introduction to Critical Gender Studies (4)

Lecture—3 hours; discussion—1 hour. Introduction to interdisciplinary, critical gender studies. Addresses the emergence of women's, gender and feminist studies internationally, its links to women's movements, and its influence within the various arts, humanities and social science disciplines. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, VL, WE—F, W, S, Su. {F, W, S, Su}

#### 60. Feminist Critiques of Western Thought (4)

Lecture/discussion—4 hours. Critical introduction to major traditions of social thinking in the West from a feminist perspective. Offered irregularly. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.

#### 70. Theory and History of Sexualities (4)

Lecture/discussion—4 hours. Key issues in the social construction, organization, and reproduction of sexualities such as the intersection of sexual identity with gender, race, ethnicity, and class, and the relation between movements for sexual liberation and the regulation of the body. GE credit: ArtHum or SocSci, Div | ACGH, AH or SS, DD, WE.

#### 80. Special Topics in Women's Studies (4)

Lecture/discussion—4 hours. Limited enrollment. In-depth examination of a women's studies topic related to the research interest of the instructor. May be repeated for credit when topic differs. Offered irregularly.

#### 90X. Lower Division Seminar (2)

Seminar—2 hours. Examination of a special topic in Women's Studies through shared readings, discussions, and written assignments.

#### 91. Research Seminar in the Transnational Production and Consumption of Fashion (1-2)

Seminar—1-2 hours. Preparation for a research conference. May be repeated for credit when topic varies.

#### 98. Directed Group Study (1-5)

Prerequisite: consent of instructor. {P/NP grading only.)

#### 99. Special Study for Undergraduates (1-5)

Prerequisite: consent of instructor. {P/NP grading only.)

### Upper Division

#### 102. Gender and Post Colonialism (4)

Lecture/discussion—4 hours; term paper. Prerequisite: course 50, 60. Explores changing configurations of race, gender, sexuality, class and implications for governmentality in one or more colonial or postcolonial regimes in one or more societies. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, DD, WC, WE.

#### 103. Introduction to Feminist Theory (4)

Lecture/discussion—4 hours. Prerequisite: course 50 recommended or consent of instructor. Introduction to the emergence of feminist theory and to key concepts in feminist theorizing. Examination of past and current debates over sexuality, race, identity politics,

and the social construction of women's experience. GE credit: ArtHum or SocSci | ACGH, AH or SS, DD, WE. —F. (F.)

#### **104. Feminist Approaches to Inquiry (4)**

Lecture/discussion—4 hours. Prerequisite: course 50 recommended or consent of instructor. Feminist applications and transformations of traditional disciplinary practices; current issues and methodologies in feminist interdisciplinary work. GE credit: ArtHum or SocSci | ACGH, AH or SS, DD, WE. —W. (W.)

#### **130. Feminism and the Politics of Family Change (4)**

Lecture/discussion—4 hours. Examination of contemporary conflicts over family values and the changing family from a feminist perspective. Offered in alternate years. GE credit: ArtHum or SocSci, Div | ACGH, AH or SS, DD, WE. —W. (W.)

#### **136. Topics in Gender, Production, Consumption and Meaning (4)**

Lecture/discussion—3 hours; term paper Construction of gender through production and consumption of goods and services. Transnational movement of peoples and products. Topics may include fashion, film, food, and technology. May be repeated for credit. Offered irregularly. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WC, WE.

#### **137. Feminist Interpretations of Contemporary Western Thought (4)**

Lecture/discussion—4 hours. Introduction to deciphering, demystifying, and interpreting poststructuralist, postmodern, and postcolonial thought from a feminist perspective: applications to gender, race, sexuality, and class. Offered irregularly. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.

#### **138. Critical Fashion Studies (4)**

Lecture/discussion—4 hours. Feminist cultural studies of style-fashion-dress through transnational circuits, personal subjectivities. Fashion as means of gender oppression and liberation. Histories and discourses of masculinities and femininities. Clothing works on global assembly line. Use of dress in construction / regulation of identities. Offered irregularly. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, DD, VL, WC, WE.

#### **139. Feminist Cultural Studies (4)**

Lecture/discussion—4 hours. The histories, theories, and practices of feminist traditions within Cultural Studies. (Same as course American Studies 139.) Offered irregularly. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, VL, WE.

#### **140. Gender and Law (4)**

Lecture/discussion—4 hours. Exploration of women's legal rights in historical and contemporary context, discussing a variety of legal issues and applicable feminist theories. Topics include constitutional equal protection, discrimination in employment and education, sexual orientation discrimination, and the regulation of abortion. Offered irregularly. GE credit: SocSci, Div | ACGH, DD, SS.

#### **145. Women's Movements in Transnational Perspective (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 50 recommended. Class size limited to 90 students. Transnational perspectives on twentieth and twenty-first century women's movements in Western, colonial and post-colonial contexts, examining movement's forms and political orientations and relationships between women's movements and other forces for change. Offered in alternate years. GE credit: ArtHum or SocSci, Div | AH or SS, OL, WC, WE.

#### **148. Science, Gender, and Social Justice (4)**

Lecture/discussion—4 hours; term paper. Class size limited to 60 students. Critical reading and reflection on the history of Western science, scientific institutions and the changing role of science in relation to inequalities of class, race, gender and sexuality, and global struggles for equality and justice. Offered irregularly. GE credit: ArtHum or SocSci, Div | AH or SS, DD, WC, WE.

#### **158. Contemporary Masculinities (4)**

Lecture/discussion—4 hours. A multicultural study of contemporary trends in masculinity and the economic, social and political forces that have shaped them. Topics may include men's movements, ethnic nationalist masculinities, and images of masculinity in popular culture. Offered in alternate years. GE credit: ArtHum or SocSci, Div | ACGH, AH or SS, DD, WE.

#### **160. Women, 'Race' and Sexuality in Postcolonial Cinema (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Class size limited to 90 students. Feminist analysis of race, sexuality and class in the representation of women in commercial and/or independent films. Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.

#### **162. Feminist Film Theory and Criticism (4)**

Lecture/discussion—3 hours; film-viewing—3 hours. Historical overview of and contemporary issues in feminist film theory, including representation, spectatorship, and cultural production. Film stars, women filmmakers, and the intersections of gender, race, sexuality, and class in films and their audiences. Offered in alternate years. GE credit: ArtHum, Div | ACGH, AH, DD, VL, WC, WE.

#### **164. Topics in Gender and Cinematic Representation (4)**

Lecture/discussion—3 hours; film-viewing—3 hours. Examination of a specific topic within the broad rubric of gender and cinema. Possible topics include Latinas in Hollywood; gender, nation, cinema; and gender and film genre. Topics vary. May be repeated two times for credit when topic differs. Offered in alternate years. GE credit: ArtHum, Div | AH, VL, WC, WE.

#### **165. Feminist Media Production (6)**

Lecture/discussion—3 hours; laboratory—3 hours; fieldwork—6 hours. Prerequisite: one course in Women and Gender Studies or consent of instructor. Basic media production and community service. Video, audio and photography instruction; feminist community documentary; video ethnography; video journals; alternative representations of fashion and women's bodies. Fundamentals of camera and microphone operation, interviewing techniques, and editing. May be repeated two times for credit when topic differs. Offered irregularly. GE credit: ArtHum or SocSci, Div | ACGH, AH or SS, DD, VL.

#### **170. Queer Studies (4)**

Lecture/discussion—4 hours. Prerequisite: course 70 recommended or consent of instructor. Study of queer sexualities, identities, theories, practices. Alternative sexualities as historical, social, and cultural constructions in intersections with race, gender, class, nationality. Interdisciplinary exploration of sexual liberation and the regulation of sexuality through history, theory and expressive cultural forms. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.

#### **175. Gender and Experience of Race (4)**

Lecture/discussion—4 hours. Exploration of the co-construction of "race" and gender in comparative national historical contexts and contemporary lived experience. Study of intersections of race and gender in identities and how institutions, labor migration, social movements and consumption shape racialized gendered identities. Offered irregularly. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.

#### **178A. Women Writers and the Transnational Imaginary (4)**

Lecture/discussion—4 hours. Prerequisite: consent of instructor. Writings by women from diverse regions and cultures, understood in their cultural, socio-economic, and historical contexts, with each course offering a focus on women's writing in specific geographic/national locations and their diasporas: The Arab World. Offered irregularly. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Constable

#### **178B. Women Writers and the Transnational Imaginary (4)**

Lecture/discussion—4 hours. Writings by women from diverse regions and cultures, understood in their cultural, socio-economic, and historical contexts, with each course offering a focus on women's writing in specific geographic/national locations and their diasporas: Asia. Offered irregularly. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Constable

#### **178C. Women Writers and the Transnational Imaginary (4)**

Lecture/discussion—4 hours. Writings by women from diverse regions and cultures, understood in their cultural, socio-economic, and historical contexts, with each course offering a focus on women's writing in specific geographic/national locations and their diasporas: The Caribbean. Offered irregularly. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Constable

#### **178D. Women Writers and the Transnational Imaginary (4)**

Lecture/discussion—4 hours. Writings by women from diverse regions and cultures, understood in their cultural, socio-economic, and historical contexts, with each course offering a focus on women's writing in specific geographic/national locations and their diasporas: Africa. Offered irregularly. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Constable

#### **178E. Women Writers and the Transnational Imaginary (4)**

Lecture/discussion—4 hours. Writings by women from diverse regions and cultures, understood in their cultural, socio-economic, and historical contexts, with each course offering a focus on women's writing in specific geographic/national locations and their diasporas: Diasporic Women Writers in Europe. Offered irregularly. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Constable

#### **178F. Transnationalism and Writing by Women of Color (4)**

Lecture/discussion—4 hours. Writings by women of color in a transnational framework, understood in their cultural, socio-economic, and historical contexts. The interrelation among gender, writing, nationalism, and transnationalism, with focus on women's writing in specific geographic/national locations and their diasporas: Topics on Women Writers of Color. Offered irregularly. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

#### **179. Gender and Literature (4)**

Lecture/discussion—4 hours. Prerequisite: one course in Women's Studies, or consent of instructor. Role of literature, especially novels, in constructing, challenging, and transforming normative genders in society. Transhistorical and transnational focus on gender in its intersections with race, class, sexuality, and politics. Offered irregularly. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

#### **180. Women of Color Writing in the United States (4)**

Lecture/discussion—4 hours. Prerequisite: course 20 or 50. Literature, especially novels, written by contemporary women of color in the United States, understood in their socio-economic, cultural and historical contexts. Offered irregularly. GE credit: ArtHum, Div | ACGH, AH, DD, WE.

#### **182. Globalization, Gender and Culture (4)**

Lecture/discussion—4 hours. Critical gender analysis of globalization as a process of interconnected cultural, social and economic transformations inflected by gender, nation, class and race/ethnicity. Critical self-reflection and social observation skills. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, OL, WC, WE.—S. (S.)

#### **184. Gender in the Arab World (4)**

Lecture/discussion—4 hours. Examination of the history, culture, and social/political/economic dynamics of gender relations and gendering in the Arab world. Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WC, WE.

**185. Women and Islamic Discourses (4)**

Lecture/discussion—4 hours. Prerequisite: course 50 or comparable course. Introduction to the debates/discourses about women and Islam. Transformations in debates/discourses in colonial and postcolonial periods in the Middle East & South Asia. Comparative study of debates/discourses on family, work, law, sexuality, religion, comportment, human rights, feminist and religious movements. (Same course as Middle East/South Asia Studies 150.) Offered irregularly. GE credit: ArtHum or SocSci | AH or SS, WE.

**187. Gender and Social Policy (4)**

Lecture/discussion—3 hours; term paper. Role of gender in the creation of social policies, especially with respect to issues brought into the policy arena by contemporary feminism. Offered in alternate years. GE credit: SocSci, Div | ACGH, DD, SS, WE.

**189. Special Topics in Critical Gender Studies (4)**

Lecture/discussion—4 hours. In-depth examination of a women's studies topic related to the research interests of the instructor. May be repeated one time for credit when topic differs. Offered irregularly. GE credit: ArtHum or SocSci | AH or SS, WE.

**190. Senior Seminar (4)**

Seminar—4 hours. Capstone course for senior Women's Studies majors, which focuses on current issues on feminism as they impact theory, public policy, and practice. GE credit: ArtHum or SocSci | ACGH, AH or SS, DD. —S. (S.)

**191. Capstone Seminar (4)**

Seminar—4 hours. Revision, completion, and presentation of senior research or creative project. Creating a multimedia Web site for publishing research and creative projects. GE credit: ArtHum or SocSci, Wrt | ACGH, AH or SS, DD, WE.

**192. Internship in Women's Studies (1-12)**

Internship—3-36 hours; written report. Prerequisite: completion of a minimum of 84 units and consent of instructor; enrollment dependent on availability of intern positions with priority to Women's Studies majors. Supervised internship and study in positions/institutional settings dealing with gender-related problems or issues, as for example, a women's center, affirmative action office, advertising agency, or social welfare agency. Final written report on internship experience. (P/NP grading only.)

**193. Feminist Leadership Seminar (2)**

Seminar—2 hours. Use feminist methods to critically reflect on the ethical, methodological and strategic aspects of an organization, project, campaign, movement or other social change initiative. May be repeated for credit. (P/NP grading only.) Offered irregularly. GE credit: ArtHum or SocSci | ACGH, AH or SS, DD, WE.

**194HA. Senior Honors Project in Women's Studies (4-6)**

Independent study—12 hours. Prerequisite: senior standing, Women's Studies major, and adviser's approval. In consultation with an adviser, students complete a substantial research paper or significant creative project on a Women's Studies topic. (Deferred grading only, pending completion of sequence.) GE credit: ArtHum or SocSci | AH or SS, WE.

**194HB. Senior Honors Project in Women's Studies (4-6)**

Independent study—12 hours. Prerequisite: senior standing, Women's Studies major, and adviser's approval. In consultation with an adviser, students complete a substantial research paper or significant creative project on a Women's Studies topic. (Deferred grading only, pending completion of sequence.) GE credit: ArtHum or SocSci | AH or SS, WE.

**195. Thematic Seminar in Critical Gender and Women's Studies (4)**

Seminar—4 hours. Group study of a topic, issue or area in feminist theory and research involving intensive reading and writing. May be repeated for credit. Offered irregularly. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, ACGH, DD, WE.

**197T. Tutoring in Women's Studies (1-4)**

Tutoring—3-12 hours. Prerequisite: upper division standing and consent of director. Leading small, voluntary discussion groups affiliated with a Women's Studies course. May be repeated for credit for a total of 8 units. (P/NP grading only.) Offered irregularly.

**198. Directed Group Study (1-5)**

Prerequisite: upper division standing; consent of instructor. (P/NP grading only.) Offered irregularly.

**199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: upper division standing; consent of instructor. (P/NP grading only.) Offered irregularly.

**Graduate****200A. Current Issues in Feminist Theory (4)**

Seminar—4 hours. Current issues in feminist theory; techniques employed to build feminist theory in various fields.

**200B. Problems in Feminist Research (4)**

Seminar—4 hours. Prerequisite: course 200A with a grade of B+ or better. Application of feminist theoretical perspectives to the interdisciplinary investigation of a problem or question chosen by the instructor(s). May be repeated for credit when subject area differs.

**201. Special Topics in Feminist Theory and Research (4)**

Lecture/discussion—4 hours. Limited enrollment. Explores in depth a topic in feminist theory and research related to the research interests of the instructor. May be repeated for credit when topic differs. Offered irregularly.

**250. Cultural Study of Masculinities (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Interdisciplinary approaches to understanding the social and cultural construction of masculinities; attention to the effects of biology, gender, race, class, sexual and national identities; criticism of oral, printed, visual, and mass mediated texts, and of social relations and structures. (Same course as American Studies 250.) Offered irregularly.

**299. Special Study for Graduate Students (1-12)**

(S/U grading only.) Offered irregularly.

**299D. Dissertation Research and Writing (4)**

Prerequisite: courses 200A and 200B; fulfillment of course requirements for the DE in Feminist Theory and Research, advancement to candidacy. (S/U grading only.) Offered irregularly.

**Professional****396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.) Offered irregularly.

**Genetics**

**See Molecular and Cellular Biology, on page 463; and Integrative Genetics and Genomics (A Graduate Group), on page 380.**

**Geographic Information Systems**

(College of Agricultural and Environmental Sciences)

The Department of Biological and Agricultural Engineering offers a minor in Geographic Information Systems with an emphasis on spatial analysis. This minor is ideal for students interested in information processing of spatial data related to remote sensing, land information systems, marine cartography, thematic mapping, surface modeling, environmental modeling resources management, public utility planning, emergency response, geomarketing, geotechnics, precision agriculture, archaeology, military exercises, and computer-aided design. Prerequisites include Mathematics 16A-16B, Statistics 13 or Plant Sciences 120 or Civil and Environmental Engineering 114, and Plant Sciences 21 or Computer Science Engineering 15.

**Minor Program Requirements:**

UNITS

**Geographic Information Systems ..... 18**

Applied Biological Systems Technology / Landscape Architecture 150, Applied Biological Systems Technology 181N or 182, Environmental Science & Management 186, 186L .....	13
Select five or more units from: Applied Biological Systems Technology/Hydrologic Science 181N or 182 Environmental Science & Management 108, 185 Environmental Science and Policy 168A, 168B, 171, 179 .....	5

**Minor Adviser.** S. K. Upadhyaya and S.G. Vougioukas (*Biological and Agricultural Engineering Department*)

**Geographic Studies**

(College of Agricultural and Environmental Sciences)

The interdepartmental minor in Geographic Studies is defined by its concern with place. Geographers strive to answer spatial questions regarding the earth's surface; to describe and explain the character of regions; to ascertain the ways in which historical and contemporary humans have used and shaped the earth's surface; and to understand the interactions of physical, biotic, and human systems within our global environment. The minor is compatible with a variety of environmental majors in the college and also with graduate programs in geography.

The minor is sponsored by the Department of Environmental Design.

**Geography**

**See Geography (A Graduate Group), below.**

**Geography (A Graduate Group)**

Robert Hijmans, Ph.D., Chairperson of the Group

**Group Office.** Carrie Armstrong-Rupert, Student Affairs Officer; 133 Hunt Hall 530-752-4119; [carupert@ucdavis.edu](mailto:carupert@ucdavis.edu) <http://geography.ucdavis.edu>

**Faculty**

Gwen Arnold, Ph.D., Assistant Professor (*Environmental Science and Policy*)

Tom Beamish, Ph.D., Associate Professor (*Sociology*)  
Chris Benner, Ph.D., Professor (*Human Ecology*)

Stephen Boucher, Ph.D., Associate Professor (*Agricultural and Resource Economics*)  
 Mary Cadenasso, Ph.D., Associate Professor (*Plant Sciences*)  
 Diana Davis, Ph.D., Associate Professor (*History*)  
 Adela de la Torre, Ph.D., Professor (*Chicana/o Studies*)  
 Natalia Deeb-Sossa, Ph.D., Associate Professor (*Chicana/o Studies*)  
 Patsy Eubanks Owens, M.L.A., Professor and Chair (*Human Ecology*)  
 Ryan Galt, Ph.D., Associate Professor (*Human Ecology*)  
 Steven Greco, Ph.D., Associate Professor (*Human Ecology*)  
 Luis Guarinzo, Ph.D., Professor (*Human Ecology*)  
 Erin Hamilton, Ph.D., Assistant Professor (*Sociology*)  
 Susan Handy, Ph.D., Professor (*Environmental Science and Policy*)  
 Andrew Hargadon, Ph.D., Professor and Chair (*Graduate School of Management*)  
 Lynette Hart, Ph.D., Professor (*Population Health and Reproduction*)  
 Robert Hijmans, Ph.D., Associate Professor (*Environmental Science and Policy*)  
 Hsuan Hsu, Ph.D., Associate Professor (*English*)  
 Yufang Jin, Ph.D., Assistant Professor (*Land Air & Water Resources*)  
 Carl Keen, Ph.D., Professor (*Nutrition*)  
 Martin Kenney, Ph.D., Professor (*Human Ecology*)  
 A. Peter Klimley, Ph.D., Adjunct Professor (*Wildlife, Fish and Conservation Biology*)  
 Frank Loge, Ph.D., Professor (*Civil and Environmental Engineering*)  
 Jonathan London, Ph.D., Associate Professor (*Human Ecology*)  
 Jeff D. Loux, Ph.D., Assistant Adjunct Professor (*Human Ecology*)  
 Mark Lubell, Ph.D., Professor (*Environmental Science and Policy*)  
 Jay R. Lund, Ph.D., Professor (*Civil and Environmental Engineering*)  
 Amina Mama, Ph.D., Professor (*Women and Gender Studies*)  
 Beth Rose Middleton, Ph.D., Assistant Professor (*Native American Studies*)  
 Brett Milligan, Ph.D., Assistant Professor (*Human Ecology*)  
 N. Claire Napawan, M.L.A., Assistant Professor (*Human Ecology*)  
 Bettina Ng'l'Weno, Ph.D., Associate Professor (*African American and African Studies Program*)  
 Deb Niemeier, Ph.D., Professor (*Civil and Environmental Engineering*)  
 Michael Rios, Ph.D., Associate Professor (*Human Ecology*)  
 Lynn Roller, Ph.D., Professor (*Classics, Art History*)  
 Ann Savageau, Ph.D., Professor (*Design*)  
 Mark Schwartz, Ph.D., Professor (*Environmental Science and Policy*)  
 Art Shapiro, Ph.D., Professor (*Evolution and Ecology*)  
 Sheryl-Ann Simpson, Ph.D., Assistant Professor (*Human Ecology*)  
 Aaron Smith, Ph.D., Associate Professor (*Agricultural and Resource Economics*)  
 Smriti Srinivas, Ph.D., Professor (*Anthropology*)  
 Julie Sze, Ph.D., Associate Professor (*American Studies*)  
 Thomas P. Tomich, Ph.D., Professor (*Human Ecology*)  
 Susan Ustin, Ph.D., Professor (*Land, Air and Water Resources*)  
 M. Anne Visser, Ph.D., Assistant Professor (*Human Ecology*)  
 Charles Walker, Ph.D., Associate Professor (*History*)  
 Wesley W. Wallender, Ph.D., Professor (*Land, Air and Water Resources*) Academic Senate Distinguished Teaching Award  
 Karen Watson-Gegeo, Ph.D., Professor (*School of Education*)  
 Stephen Wheeler, Ph.D., Associate Professor (*Human Ecology*)  
 Diane Wolf, Ph.D., Professor (*Sociology*)

Truman Young, Ph.D., Professor (*Plant Sciences*)  
 Minghua Zhang, Ph.D., Professor (*Land Air and Water Resources*)  
**Emeriti Faculty**  
 Michael Barbour, Ph.D., Professor Emeritus (*Plant Sciences*)  
 David Boyd, Ph.D., Associate Professor Emeritus (*Anthropology*)  
 Cynthia Brantley, Ph.D., Professor Emeritus (*History*)  
 Stephen Brush, Ph.D., Professor Emeritus (*Human and Ecology*)  
 Thomas A. Cahill, Ph.D., Professor Emeritus  
 Dennis Dingemans, Ph.D., Associate Professor Emeritus (*Geography*)  
 Deborah Elliott-Fisk, Ph.D., Sr. Lecturer, SOE Emeritus (*Wildlife, Fish and Conservation Biology*)  
 Joan Florsheim, Ph.D., Associate Research Scientist, Emeritus (*Geology*)  
 Mark Francis, M.L.A., Professor Emeritus (*Human Ecology*)  
 Isao Fujimoto, Ph.D., Sr. Lecturer SOE Emeritus (*Human Ecology*)  
 Charles Goldman, Ph.D., Professor Emeritus (*Environmental Science and Policy*) *Distinguished Graduate Mentoring Award*  
 James Grieshop, Ph.D., Specialist in Cooperative Extension Emeritus (*Human Ecology*)  
 Louis Grivetti, Ph.D., Professor Emeritus (*Nutrition*)  
 Joyce Gutstein, Ph.D., Director, Emeritus (*Public Service Research Program*)  
 Frank Hirtz, L.L.D., Ph.D., Sr. Lecturer SOE, Emeritus (*Human Ecology*)  
 Richard Howitt, Ph.D., Professor Emeritus (*Agricultural and Resource Economics*)  
 Suad Joseph, Ph.D., Professor Emeritus (*Anthropology*)  
 Nguyen Kien, Ph.D., Professor Emeritus (*Anesthesiology*)  
 F. Thomas Leding, Ph.D., Adjunct Professor Emeritus (*Plant Sciences*)  
 Dean MacCannell, Ph.D., Professor Emeritus (*Human Ecology*)  
 Heath Massey, M.L.A., Professor Emeritus (*Human Ecology*)  
 E. Steve McNeil, M.L.A., Sr. Lecturer, SOE Emeritus (*Landscape Architecture*)  
 Jay Mechling, Ph.D., Professor Emeritus (*American Studies*)  
 Patricia Mohktarian, Ph.D., Professor Emeritus (*Civil and Environmental Engineering*)  
 Janet Momson, Ph.D., Professor Emeritus (*Human Ecology*)  
 Jeffrey Mount, Ph.D., Professor Emeritus (*Geology*)  
 Peter B. Moyle, Ph.D., Professor Emeritus (*Wildlife, Fish and Conservation Biology*)  
 Ben Orlove, Ph.D., Professor Emeritus (*Environmental Science and Policy*)  
 Richard Plant, Ph.D., Professor Emeritus (*Plant Sciences*)  
 James Quinn, Ph.D., Professor Emeritus (*Environmental Science and Policy*)  
 David Robertson, Ph.D., Professor Emeritus (*English*)  
 Margaret Rucker, Ph.D., Professor Emeritus (*Textiles and Clothing*)  
 Michael P. Smith, Ph.D., Professor Emeritus (*Human Ecology*)  
 Margaret Swain, Ph.D., Associate Adjunct Professor, Emeritus (*Women and Gender Studies*)  
 Robert L. Thayer, Jr., M.A., Professor Emeritus (*Human Ecology*)  
 Stefano Varese, Ph.D., Professor Emeritus (*Native American Studies*)  
 Geoffrey Wandesforde-Smith, Ph.D., Associate Professor Emeritus  
 Miriam J. Wells, Ph.D., Professor Emeritus (*Human Ecology*)  
**Affiliated Faculty**  
 Dave C. Campbell, Ph.D., Specialist in Cooperative Extension (*Human Ecology*)  
 Elise Gornish, Ph.D., Assistant Specialist in Cooperative Extension (*Plant Sciences*)  
 Eric Larsen, Ph.D., Associate Research Scientist (*Human Ecology*)

E. Greg McPherson, Ph.D., Lecturer and Associate in the Agricultural Experiment Station  
 Lorene Oki, Ph.D., Associate Specialist in Cooperative Extension (*Plant Sciences and Human Ecology*)  
 Hugh Safford, Ph.D., Regional Ecologist/Lecturer WOS (*Environmental Science and Policy*)  
 Kenneth Tate, Ph.D., Specialist in Cooperative Extension (*Plant Sciences*)  
 James Thorne, Ph.D., Research Scientist (*Environmental Science and Policy*)  
 Joshua Viers, Ph.D., Associate Research Scientist (*John Muir Institute of the Environment*)

**Graduate Study.** The Graduate Group in Geography (GGG) offers programs of study and research leading to the M.A. and Ph.D. degrees. Faculty and students share a common interest in spatial interaction between humans and the biophysical environment. The wide faculty interests attract a diverse set of students in such areas as biogeography, urban forestry and related natural science and engineering fields, as well as human geography and related social science fields. A number of faculty members use and teach geographic information systems, remote sensing, and related geographic techniques, and most have a strong field orientation. The strengths of the Davis campus and its faculty enable the program to focus on important issues including people, place and power, community and regional identity and change, people-environment interaction, agricultural sustainability, landscape architecture, environmental change, biogeography, natural resource management, and technological innovations in computing and the use of geographic information systems. Students are mentored by faculty across the many colleges of the university.

**Preparation.** Most students considered for admission will have an undergraduate major in geography or in a closely related field. Generally, a student without an undergraduate degree in geography will be required to complete the equivalent of a minor in geography, consisting of one course each in human geography, physical geography and geographic methods, plus any additional undergraduate coursework required as background for the student's research emphasis, as determined by the student's guidance committee.

**Graduate Advisers.** Ryan Galt (*Human Ecology*), Robert Hijmans (*Environmental Science and Policy*), Jay Lund (*Civil and Environmental Engineering*), James Quinn (*Environmental Science and Policy*), M. Anne Visser (*Human Ecology*)

## Courses in Geography (GEO) Graduate

### 200AN. Geographical Concepts (4)

Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing in Geography or consent of instructor. Concepts and thematic content of the discipline, including contemporary research questions. A brief review of the history of geographic thought and practice is done at the beginning of the course.—F. (F.)

### 200BN. Theory & Practice of Geography (4)

Lecture/discussion—4 hours. Prerequisite: graduate standing. Class size limited to 20. Development, application, and philosophical background of theory in discipline of geography and geographical knowledge production. Similarities and differences in theories employed in physical and human geography and cartography. Geographic contributions to interdisciplinary theory bridging biophysical sciences, social sciences, and humanities.—W. (W.) Galt, Rios

### 200CN. Quantitative Geography (4)

Lecture—2 hours; laboratory—6 hours. Class size limited to 25 students. Provides an overview of quantitative approaches in spatial data analysis. Overview of different approaches used for inference, modeling, and prediction. Also learn how to write computer programs to implement these methods.—S. (S.) Hijmans

**200DN. Socio-Spatial Analysis in Geography (4)**

Lecture/discussion—4 hours. Class size limited to 25. Introduction to methodologies of socio-spatial analysis in interviews, and ethnographic fieldwork. Students develop a critical understanding of different methodological and theoretical approaches, and their appropriate applications in overall research design.—W. (W.) Eubanks-Owens

**200E. Advanced Research Design in Geography (2)**

Lecture/discussion—2 hours. Prerequisite: graduate standing; courses 200AN, 200BN, 200CN and 200DN. Class size limited to 15. Helps Ph.D. students develop their research question, design their research plan and complete a full dissertation research proposal.—F. (F.)

**201. Sources and General Literature of Geography (4)**

Discussion—4 hours. Prerequisite: graduate standing in geography; consent of instructor. Designed for students preparing for higher degrees in geography. May be repeated for credit in one or more of the following subfields: physical, cultural, economic, urban, historical, political, conservation, and regional geography.

**210. Topics in Biogeography (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: Evolution and Ecology 147 or Wildlife, Fish, and Conservation Biology 156 (may be taken concurrently) or equivalent. Consent of instructor required for undergraduates. Current topics in historical and ecological biogeography, including macroecology and areography, GIS and remote sensing, phylogeny, vegetation, plant and animal community and species geography. Systematics, climate change, and conservation will be addressed. Offered in alternate years.—(W.) Shapiro

**211. Physical Geography Traditions and Methods (3)**

Lecture/discussion—2 hours; term paper. Prerequisite: introductory course in physical geography. Graduate-level standing in geography or related discipline. Discussion of the physical science tradition in geography, including key concepts and current research in climatology, geomorphology, soils geography, biogeography, climate change, watershed science, and coastal studies. Research paradigms, programs, and methods as used by physical geographers will be discussed. May be repeated three times for credit. Offered in alternate years.—(F.)

**212. Water Resource Management (3)**

Lecture—3 hours. Prerequisite: Civil and Environmental Engineering 114, 141, and 142; Civil and Environmental Engineering 153 recommended. Engineering, institutional, economic, and social basis for managing local and regional water resources. Examples in the context of California's water development and management. Uses of computer modeling to improve water management. (Same course as Civil and Environmental Engineering 267.)—F. (F.) Lund

**214. Seminar in Geographical Ecology (2)**

Seminar—2 hours. Prerequisite: Evolution and Ecology 100 or 101 or consent of instructor. Recent developments in theoretical and experimental biogeography, historical biogeography and related themes in systematics, the biology of colonizing species, and related topics. (Same course as Population Biology 296.) (S/U grading only.)—S. (S.) Shapiro

**215. Ecologies of Infrastructure (4)**

Seminar—4 hours. Open to graduate standing or consent of instructor. Focus on design practices and theory associated with ecological conceptions of infrastructure, including networked infrastructure, region, bioregion, regionalization, ecological engineering, reconciliation ecology, novel ecosystems, and theory/articulation of landscape change. Offered in alternate years. (Same course as Landscape Architecture 215.)—Milligan

**220. Topics in Human Geography (4)**

Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Class size limited to 20 students. Examination of philosophy and theory in human geography with an emphasis on contemporary debates and concepts in social, cultural, humanistic, political, and economic geographies. Specific discussion of space, place, scale and landscape; material and imagined geographies. Offered in alternate years.—W. (W.) Rios

**230. Citizenship, Democracy, & Public Space (4)**

Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Introduction to seminal works in political theory, philosophy, and the social sciences that focus on citizenship and the public sphere; development of critical perspective regarding restructuring of public space in a pluralistic and global culture; discussion of contemporary case studies. (Same course as Landscape Architecture 200.)—S. (S.) Rios

**233. Urban Planning and Design (4)**

Lecture—2 hours; discussion—2 hours. Limited to graduate students. Regulation, design, and development of the built landscape, planning and land development processes, zoning and subdivision regulation, site planning, urban design goals and methods, public participation strategies, creatively designing landscapes to meet community and ecological goals. (Same course as Landscape Architecture 205.)—F. (F.) Wheeler

**236. Transportation Planning and Policy (4)**

Lecture/discussion—4 hours. Limited enrollment. Transportation planning process at the regional level, including the role of federal policy in shaping regional transportation planning, tools and techniques used in regional transportation planning, issues facing regional transportation planning agencies, pros and cons of potential solutions and strategies. Students taking this course previously as Transportation Planning and Policy 289 cannot repeat it for credit. Taking other Transportation Planning and Policy 289 offerings does not preclude taking Transportation Planning and Policy 220 for credit. (Same course as Transportation Planning and Policy 220.) Offered in alternate years.—S. Handy

**241. The Economics of Community Development (4)**

Seminar—4 hours. Prerequisite: graduate standing. Economic theories and methods of planning for communities. Human resources, community services and infrastructure, industrialization and technological change, and regional growth. The community's role in the greater economy. (Same course as Community and Regional Development 241.)—F. (F.) Kenney

**245. The Political Economy of Urban and Regional Development (4)**

Lecture—4 hours. Prerequisite: Community and Regional Development 157, 244, or the equivalent. How global, political and economic restructuring and national and state policies are mediated by community politics; social production of urban form; role of the state in uneven development; dynamics of urban growth and decline; regional development in California. (Same course as Community & Regional Development 245.) Offered irregularly.—W. (W.)

**246. The Political Economy of Transnational Migration (4)**

Lecture—4 hours. Prerequisite: graduate standing. Theoretical perspectives and empirical research on social, cultural, political, and economic processes of transnational migration to the U.S. Discussion of conventional theories will precede contemporary comparative perspectives on class, race, ethnicity, citizenship, and the ethnic economy. (Same course as Community & Regional Development 246.)—S. (S.) Guarnizo

**248. Social Policy, Welfare Theories and Communities (4)**

Seminar—4 hours. Prerequisite: graduate standing. Theories and comparative histories of modern welfare states and social policy in relation to legal/normative, organizational, and administrative aspects.

Analysis of specific social issues within the U.S./California context. Not open for credit to students having completed Community & Regional Development 248A and 248B. (Same course as Community & Regional Development 248.) Offered in alternate years.—(S.)

**252. Landscape and Power (4)**

Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. How various representations of landscape have historically worked as agents of cultural power. Course framework is interdisciplinary, including studies of landscape representation in literature, art, photography, cartography, cinema, and landscape architecture. (Same course as Landscape Architecture 260.)—F. (F.)

**254. Political Ecology of Community Development (4)**

Lecture—4 hours. Prerequisite: graduate standing. Community development from the perspective of geographical political ecology. Social and environmental outcomes of the dynamic relationship between communities and land-based resources, and between social groups. Cases of community conservation and development in developing and industrialized countries. (Same course as Community and Regional Development 244.) Offered in alternate years.—W. Galt

**260. Global Political Ecology (4)**

Seminar—3 hours; term paper or discussion—1 hour. Open to graduate students only or consent of instructor. Background, genesis, current debates in political ecology. Examination of political-economic and social-cultural causes of environmental change. Introduction to development theory, globalization, history of science and power/knowledge. Cases of social movements, justice, resistance, gender, race and class. Focus outside North America. Offered in alternate years.—F. S. Davis

**270. Experimental Design and Analysis (5)**

Lecture—3 hours; discussion/laboratory—2 hours. Prerequisite: Plant Sciences 120 or equivalent. Introduction to the research process and statistical methods to plan, conduct and interpret experiments.—W. (W.) Dubcovsky

**271. Applied Multivariate Modeling in Agricultural and Environmental Sciences (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: one of Plant Sciences 120, 205, Statistics 106, 108, or equivalent. Multivariate linear and nonlinear models. Model selection and parameter estimation. Analysis of manipulative and observational agroecological experiments. Discriminant, principal component, and path analyses. Logistic and biased regression. Bootstrapping. Exercises based on actual research by UC Davis students.—F. (F.) Laca

**279. Discrete Choice Analysis of Travel Demand (4)**

Lecture—4 hours. Prerequisite: Civil and Environmental Engineering 114. Behavioral and statistical principles underlying the formulation and estimation of discrete choice models. Practical application of discrete choice models to characterization of choice behavior, hypothesis testing, and forecasting. Emphasis on computer exercises using real-world data sets. (Same course as Civil and Environmental Engineering 254.)—S. (S.)

**280. Field Studies in Geography (3)**

Lecture—1 hour; fieldwork—6 hours. Prerequisite: undergraduate or graduate coursework in geography; consent of instructor required. Limited to 20 students. A topic or subdiscipline of geography will form the theme for the course in any given offering, with a focus on current research on this topic, field methodologies, and data analysis in human and physical geography. May be repeated two times for credit.

**281. Transportation Survey Methods (4)**

Lecture—4 hours. Prerequisite: Statistics 13; Civil and Environmental Engineering 251 recommended. Description of types of surveys commonly used in transportation demand modeling, including travel and activity diaries, attitudinal, panel, computer, and stated-response surveys. Discussion of sampling,

experimental design, and survey design issues. Analysis methods, including factor, discriminant and cluster analysis. Not open for credit to students who have taken Civil and Environmental Engineering 255. (Same course as Transportation Technology and Policy 200.) –W. (W.)

### **286. Selected Topics in Environmental Remote Sensing (3)**

Discussion—2 hours; lecture—1 hour; project. Prerequisite: consent of instructor; Environmental and Resource Sciences 186 or equivalent required; Environmental and Resource Sciences 186L recommended. In depth investigation of advanced topics in remote sensing applications, measurements, and theory. Not open for credit to students who have taken Civil and Environmental Engineering 255. (Same course as Hydrologic Science 286.) May be repeated for credit. Offered irregularly.—Ustin

### **290. Seminar in Geography (1-3)**

Seminar—1-3 hours. Prerequisite: graduate standing or consent of instructor. Seminar focuses on specified topical areas within geography, which will vary quarter to quarter. Students expected to present an oral seminar on an aspect of the general topic under discussion. May be repeated six times for credit. (S/U grading only.)—F, W, S. (F, W, S.)

### **291. Seminar in Cultural Geography (4)**

Seminar—3 hours.

### **293. Graduate Internship (1-12)**

Prerequisite: consent of instructor. Individually designed, supervised internship, off campus, in community or institutional setting. Developed with advice of faculty mentor. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

### **295. Seminar in Urban Geography (4)**

Seminar—3 hours.—W. (W.)

### **297. Graduate Group in Geography Seminar (2)**

Lecture/discussion—1 hour; term paper. Prerequisite: graduate standing. Seminars by UC Davis faculty and prominent national and international scholars; research presentations by Graduate Group in Geography Ph.D. candidates. May be repeated for credit. (S/U grading only.)

### **298. Group Study (1-5)**

Prerequisite: consent of instructor. (S/U grading only.)

### **299. Research (1-12)**

(S/U grading only.)

### **299D. Individual Study (1-12)**

Prerequisite: graduate student status in Geography and consent of instructor. (S/U grading only.)

### **Professional**

### **396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## **Geology**

**See Earth and Planetary Sciences, on page 237.**

## **Geophysics**

(College of Letters and Science)

Geophysics is the study of the physical properties and processes within and surrounding the Earth. Many problems in the Earth Sciences require geophysical techniques for study. The interdisciplinary minor in geophysics is for students with backgrounds in the physical sciences, engineering and other fields who are interested in pursuing a graduate or professional career in geophysics, or those who desire a career in the energy, minerals, or environmental industries. The minor is sponsored by the Department

of Earth and Planetary Sciences in 2119 Earth and Physical Sciences Building.

### **Minor Program Requirements:**

	UNITS
<b>Geophysics .....</b>	<b>19-26</b>

Engineering 6 or Computer Science  
Engineering 30 or Mechanical  
Engineering 5 ..... 4  
Choose two courses from the following:  
Geology 160, 161, 162, 163 ..... 6  
Applied Science Engineering 115 ..... 4  
One course sequence chosen from the  
following: ..... 5-12  
(a) Atmospheric Science 120, 121A, 121B  
or,  
(b) Geology 101, 101L or,  
(c) Mathematics 118A, 118B, 118C or,  
(d) Physics 104A or Engineering 180; and  
Physics 105A; and Engineering 104 or  
Hydrology 103N or Physics 105C

**Minor Adviser.** Magali Billen, Department of Earth and Planetary Sciences.

## **German**

(College of Letters and Science)

Jaimey Fisher, Ph.D., Chairperson of the Department

**Department Office.** German and Russian  
213 Sproul Hall 530-752-1219;  
<http://german.ucdavis.edu>

### **Faculty**

Carlee Arnett, Ph.D., Associate Professor  
Jaimey Fisher, Ph.D., Associate Professor  
Gail Finney, Ph.D., Professor  
Distinguished Teaching Award-Graduate/  
Professional  
Elisabeth Krimmer, Ph.D., Professor  
Sven-Erik Rose, Ph.D., Associate Professor  
Chunjie Zhang, Ph.D., Assistant Professor

### **Emeriti Faculty**

John F. Fetzer, Ph.D., Professor Emeritus  
Ingeborg Henderson, Ph.D., Senior Lecturer Emerita  
Academic Senate Distinguished Teaching Award  
Winder McConnell, Ph.D., Professor Emeritus  
Karl R. Menges, Dr.Phil., Professor Emeritus  
H. Guenther Nerjes, Ph.D., Associate Professor  
Emeritus  
Fritz Sammern-Frankenegg, Dr.Phil., Lecturer  
Emeritus

### **Affiliated Faculty**

Kirsten Harges, Ph.D., Lecturer

### **The Major Program**

The German major explores in depth the literature and language, the culture and commerce of the German-speaking world (primarily Germany, Austria and Switzerland). The key to the major lies in the careful balance between solid core requirements and the possibility to explore German subject areas through the lens of other disciplines, such as music, art, philosophy, history, and economics.

**The Program.** The department offers courses that highlight literary figures, movements and themes. These courses form the core of upper-division literature electives, but we also offer courses that discuss contemporary culture and commerce in German-speaking countries. Regardless of emphasis, students will find maximum practice in spoken and written German as well as in listening comprehension in all upper-division courses offered in German.

**Career Alternatives.** Completion of the major prepares students for graduate study in German or for career opportunities in international fields ranging from employment in business and government to careers in the fine arts and sciences. Also, it permits admission to professional schools such as law and medicine.

### **A.B. Major Requirements:**

	UNITS
<b>Preparatory Subject Matter .....</b>	<b>0-27</b>

German 1-2-3 (or the equivalent) ..... 0-15  
German 20, 21, 22 ..... 0-12

	44
--	----

### **Depth Subject Matter .....**

German 101A, 101B, 103 ..... 12

German 120 or 118E ..... 4

Four courses chosen from upper-division

offerings taught in German ..... 16

Three additional upper division courses

selected from either 104-109 or

121-198 ..... 12

Or courses in other disciplines that focus on German history, thought, and culture, upon approval of the major adviser. Electives include, but are not limited to:

Art History 176C, 177A, 177B

Comparative Literature 138, 140-142, 147

Economics 110B, 116, 160A and 160B, 162

Film Studies 142, 176A, 176B

History 142A, and 142B, 144A and 144B

Music 110A, 110C, 110D, 110E

Philosophy 170, 175

Political Science 117, 118C, 137

Note: Many of the above electives from other disciplines have prerequisites.

The total of 44 upper-division units may include units earned in the Education Abroad Program.

	44
--	----

### **Minor Program Requirements:**

The Department offers a German minor consisting of at least 20 upper-division units of courses taught in German. Students wishing to minor in German should consult the undergraduate adviser.

	UNITS
--	-------

<b>German .....</b>	<b>20</b>
---------------------	-----------

**Major Adviser.** C. Zhang

**Honors and Honors Program.** The honors program consists of two quarters of research (194H) terminating in an honors thesis. For details consult the undergraduate major adviser. Graduation with high or highest honors requires participation in the honors program.

**Graduate Study.** The Department offers programs of study and research leading to the M.A. degree and to the Ph.D. degree in German literature. Additional degree options for a designated emphasis are available through departmental affiliations with the programs in Social Theory and Comparative History, Critical Theory, Feminist Theory and Research, and Second Language Acquisition. Detailed information may be obtained by writing to the Department Chairperson or the Graduate Adviser.

**Graduate Adviser.** S.-E. Rose

**Prerequisite Credit.** Credit normally will not be given on the lower-division level for a course that is the prerequisite of a course already successfully completed.

### **Courses in German (GER)**

#### **Lower Division**

**Course Placement.** Students with two years of high school German normally continue in German 2; those with three years, German 3; those with four years, German 20.

#### **1. Elementary German (5)**

Discussion—5 hours; laboratory—1 hour. Not open to students who have taken course 1A. Introduction to German grammar and development of all language skills in a cultural context with special emphasis on communication. Students who have successfully completed German 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the stu-

dent's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed. GE credit: ArtHum | AH, WC. —F, S. (F, S.) Arnett

#### **1A. Accelerated Intensive Elementary German (15)**

Lecture/discussion—1.5 hours. Special 12 week accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Introduction to German grammar and development of all language skills in a cultural context with emphasis on communication. Not open to students who have completed courses 1, 2, or 3. —Su. (Su.) Arnett

#### **2. Elementary German (5)**

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Not open for credit to students who have taken course 1A. Continuation of course 1 in areas of grammar and basic language skills. GE credit: ArtHum | AH, WC. —W. (W.) Arnett

#### **3. Elementary German (5)**

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Not open to students who have taken course 1A. Completion of grammar sequence and continuing practice of all language skills through cultural texts. GE credit: ArtHum | AH, OL, WC. —S. (S.) Arnett

#### **10. German Fairy Tales from the Grimms to Disney (4)**

Lecture/discussion—3 hours; term paper. Introduction to the genre of fairy tale with a focus on the Brothers Grimm and Hans Christian Andersen in their respective political/cultural contexts. Discusses filmic adaptations by Disney, the East German DEFA and Hollywood. GE credit: ArtHum, Div, Wrt | AH, VL, WE. —Krimmer

#### **11. Travel and the Modern World (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: completion of entry level writing requirement. Examination of travel as an essential human activity and experience of global modernity and cross-cultural encounters from the 18th to the 21st century with an emphasis on German-speaking culture. Travelogues, literature, art, memoirs, and films in English translation. (Same course as Comparative Literature 11.) GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE. —F, W, S. (F, W, S.) Zhang

#### **20. Intermediate German (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 3; may be taken concurrently with course 6. Review of grammatical principles by means of written exercises; expanding of vocabulary through readings of modern texts. GE credit: ArtHum | AH, OL, WC, WE.

#### **21. Intermediate German (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 20. Review of grammatical principles by means of written exercises; expanding of vocabulary through readings of modern texts; addresses social relations and cultural practices in Germany; discusses history of Germany. GE credit: ArtHum | AH, OL, WC, WE.

#### **22. Intermediate German (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 21. Review of grammatical principles by means of written exercises; expanding of vocabulary through readings of modern texts. GE credit: ArtHum | AH, OL, WC, WE.

#### **40. Great German Short Stories (in English) (4)**

Lecture/discussion—3 hours; extensive writing. Major German short stories from Goethe at the end of the eighteenth century to Thomas Mann at the beginning of the twentieth century. Offered irregularly. GE credit: AH, OL, WC, WE.

#### **45. Vampires and Other Horrors in Film and Media (4)**

Lecture—2 hours; discussion—1 hour; film viewing—3 hours. History of representations of vampires and horror generally from the 19th through 21st centuries. Emphasis on transnational history of the horror genre; psychologies of horror effects; issues of race, gender, and class; intersections with prejudice,

medicine, modernity. (Same course as Film Studies 45.) GE credit: ArtHum | ACGH, AH, DD, OL, VL, WC, WE. —Fisher

#### **48. Myth and Saga in the Germanic Cultures (4)**

Lecture—3 hours; term paper. Knowledge of German not required. English translation from the Norse Eddas, the Volsung and Sigurd-Siegfried cycles, and the Gudrun lays; literary mythology in German Romanticism culminating in Wagner's "total artwork" concept and The Ring of the Nibelung cycle. May not be counted toward major in German. Offered irregularly. GE credit: ArtHum, Wrt | AH, VL, WC, WE.

#### **49. Freshman Colloquium (2)**

Seminar—2 hours. Prerequisite: open only to students who have completed 40 or fewer quarter units of transferable college-level work. Readings, discussion and written projects treating topics such as communist-capitalist tension in German literary culture; masculine "versus" feminine authorial consciousness; disintegration and reconstitution of language reflecting cultural transformation; exorcising post-Holocaust national guilt and individual frustration—Germany's new European "mission." Offered irregularly.

#### **92. Field Work in German (1-12)**

Internship—3-36 hours. Prerequisite: lower division standing. Restricted to lower-division standing. Total immersion program in Germany or a German speaking setting in the U.S. to further develop students' proficiency in the German language. (P/NP grading only.) Offered irregularly.

#### **98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.) Offered irregularly.

#### **99. Special Study for Undergraduates (1-5)**

(P/NP grading only.) Offered irregularly.

#### **Upper Division**

##### **101A. Survey of German Literature, 800-1800 (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 22 or consent of instructor. German literature from the Middle Ages to Classicism (800-1800) with an overview of major movements and authors. GE credit: ArtHum | AH, OL, VL, WC, WE. —F. (F.) Arnett

##### **101B. Survey of German Literature, 1800-Present (4)**

Lecture/discussion—3 hours. Prerequisite: course 22. German literature from the Age of Romanticism (1800) to the present with an overview of major movements and authors. GE credit: ArtHum | AH. —W. (W.)

##### **103. Writing Skills in German (4)**

Lecture—3 hours; extensive writing—1 hour. Prerequisite: course 22 or consent of instructor. Practice in different kinds of writing, such as abstracts, correspondence, lecture summaries, analysis of or response to short literary texts. GE credit: ArtHum | AH, OL, WC, WE. —F, W, S. (F, W, S.) Zhang

##### **104. Translation (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 22 or consent of instructor. Exercises in German-to-English, English-to-German translation using texts from the areas of culture and commerce. Not open for credit to students who have completed course 104A. Offered irregularly. GE credit: ArtHum | AH, OL, VL, WC, WE. —Fisher

##### **105. The Modern German Language (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 22 or consent of instructor. Introduction to the linguistic analysis of contemporary German, including its phonology, morphology, syntax and semantics, as well as sociolinguistic considerations. Offered irregularly. GE credit: ArtHum, Wrt | AH, OL, WC, WE. —Arnett

#### **109A. Business German (4)**

Lecture/discussion—3 hours; laboratory—1 hour. Prerequisite: course 22 or consent of instructor. Specialized language course using business-oriented information and publications as the basis for discussions, roleplay, reports, compositions and translations. Offered in alternate years. —Krimmer

#### **109B. Advanced Business German (4)**

Lecture/discussion—3 hours; laboratory/discussion—1 hour. Prerequisite: course 22 or consent of instructor. Specialized advanced language course providing in-depth study of major business topics with the help of authentic texts and videos. Offered irregularly.

#### **112. Topics in German Literature (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: upper-division standing or consent of instructor. Investigation of significant themes and issues within their European context. Knowledge of German is not required. May be repeated one time for credit. Offered irregularly. GE credit: ArtHum, Wrt | AH, WC.

#### **113. Goethe's Faust (4)**

Discussion—3 hours; term paper. Knowledge of German not required. Intensive study of Goethe's Faust in its entirety. Discussions and readings in English; reading the text in the original is encouraged. Offered irregularly. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

#### **114. From Marlene Dietrich to Run, Lola Run: German Women and Film (4)**

Lecture/discussion—3 hours; extensive writing; film viewing—3 hours. Knowledge of German not required. Women in German film from the Weimar Republic to present, with special emphasis on conceptualizations of gender, historical and political context, aesthetic and filmic innovations. Offered in alternate years. GE credit: ArtHum, Wrt | AH, OL, VL, WC, WE. —Krimmer

#### **115. German Literature Since 1945 (4)**

Lecture—3 hours; extensive writing. Knowledge of German not required. Major writers of the post-war generation of Austria, Switzerland and Germany: novelists, such as Böll, Grass, Johnson, Walser, Handke; playwrights such as Frisch, Dürrenmatt and Hochhut; and poets, such as Celan, Enzensberger, and Aichinger. May be repeated for credit in different topic area. Offered irregularly. GE credit: ArtHum, Wrt | AH, WC, WE.

#### **116. Readings in Jewish Writing and Thought in German Culture (4)**

Lecture—3 hours; term paper. Prerequisite: Religious Studies 23 or consent of instructor. Historical tradition of Jewish thought in the German cultural context; unique contributions of Jewish writers to culture of the German-speaking world; what it means to be "other" in the mainstream culture. No credit will be given to those students who have completed Humanities 121. May be repeated two times for credit if topic differs. (Same course as Jewish Studies 116.) Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, OL, WC, WE. —Rose

#### **117. After the Catastrophe: Jews and Jewish Life in Post-1945 Germany (4)**

Lecture/discussion—3 hours; term paper. Jews and Jewish culture in post-1945 Germany, with special attention given to literature, historical debates, photography, film, as well as websites and other new media. Offered in alternate years. GE credit: ArtHum, Div, Wrt | ACGH, AH, DD, OL, VL, WC, WE. —Fisher

#### **118A. Vienna at the Turn of the Twentieth Century (The End of the Habsburg Empire) (4)**

Lecture—1 hour; discussion—2 hours; extensive writing. Knowledge of German not required. Cultural ferment in Vienna, capital of the multinational Habsburg empire, at the turn of the century, with consideration of innovations in literature, music, graphic arts, architecture, philosophy and psychology, heralding European modernism. Offered irregularly. GE credit: ArtHum, Wrt | AH, WC. —Finney

**118B. Weimar Culture: Defeat, the Roaring Twenties, the Rise of Nazism (4)**

Lecture—1 hour; discussion—2 hours; extensive writing. Knowledge of German not required. Expressionism in graphic arts, literature, film, New Objectivity, Brecht and Bauhaus considered in the context of the failure of the German experiment in democracy, the Weimar Republic of 1919-33. Offered irregularly. GE credit: ArtHum, Wrt | AH, WC, WE.

**118C. Germany Under the Third Reich (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: background in modern European history; course 118B recommended. No knowledge of German required. Interdisciplinary study of German society and culture during the Third Reich (1933-45); readings in aesthetics, history, and philosophy; study of Fascist culture in literature, film, architecture, and the graphic arts; focus on everyday life in Hitler's Germany. Offered irregularly. GE credit: ArtHum, Wrt | WC, WE.

**118E. Contemporary German Culture (4)**

Lecture/discussion—3 hours. Prerequisite: course 22 or consent of instructor. The political, economic, social and cultural scene of Germany today. Offered irregularly. GE credit: ArtHum, Wrt | AH, WC, WE.

**119. From German Fiction to German Film (4)**

Lecture—3 hours; discussion—1 hour; term paper. Examines a number of film adaptations of major German prose works and plays to ascertain the types of changes involved in the shift in medium and the positive and negative effects achieved by such transferences. Offered irregularly. GE credit: ArtHum, Wrt | AH, OL, VL, WC.

**120. Survey of German Culture (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 22 or consent of instructor. Major developments in German arts, philosophical thought, social institutions, and political history. GE credit: ArtHum | AH, OL, VL, WC, WE.—Zhang

**121. The Medieval Period in German Literature (4)**

Discussion—3 hours; extensive writing. Prerequisite: course 22 or consent of instructor. Literary-philosophical profile of the Mittelhochdeutsche Blütezeit in terms of the significant epics, romances, and lyric poetry. Readings in German. Offered irregularly. GE credit: ArtHum | AH.—Arnett

**122. Reformation and Baroque (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 22 or consent of instructor. Exemplary literary works of the 16th and 17th centuries tracing the principal lines of development and showing the reflection in literature of the social, as well as religious, scenes. Offered irregularly. GE credit: ArtHum | AH, OL, VL, WC, WE.

**123. Literature of the Classical Age (4)**

Discussion—3 hours; term paper. Prerequisite: course 22 or consent of instructor. A critical assessment of principal works of Goethe and Schiller within the historical and philosophical context of their times. Offered irregularly. GE credit: ArtHum | AH, WC, WE.

**124. Major Movements in German Literature (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 22 or consent of instructor. Significant movements and schools in German literary history (e.g., the medieval troubadours, Storm and Stress, the romanticists, the George Circle, the expressionists), with emphasis on the broader cultural dynamics and ideologies as these apply to individual literary works. May be repeated one time for credit when topic differs. Offered irregularly. GE credit: ArtHum | AH, WC.

**125. Short Fiction: 1880-1914 (4)**

Lecture—3 hours; term paper. Prerequisite: course 22 or consent of instructor. Reading of short German fiction from the fin-de-siècle period and representative of various prose styles and cultural currents. Offered irregularly. GE credit: ArtHum | AH, WC, WE.—Finney

**126. Modern German Literature (4)**

Discussion—3 hours; extensive writing. Prerequisite: course 22. Selections from significant works of major contemporary writers, such as Hesse, Mann, Kafka, Rilke, Brecht, Grass. May be repeated one time for credit with consent of adviser. Offered irregularly. GE credit: ArtHum | AH, WC, WE.—Finney

**127. Major Writers in German (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 22 or consent of instructor. Examination of representative works by a major writer, set in the broader cultural context of the relevant period or movement. May be repeated one time for credit when topic differs. Offered irregularly. GE credit: ArtHum | AH, WC, WE.

**129. Postwar Women Writers (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 22 or consent of instructor. Major writers in both Germany, Austria, and Switzerland since 1945. Topics include the concept of a feminist aesthetics, East vs. West German writers, and the status of minority women writers in Germany (Jewish, Turkish-German, Afro-German). Offered irregularly. GE credit: ArtHum, Div | AH, WC, WE.—Finney

**131. German Lyric Poetry (4)**

Lecture—3 hours; term paper. Prerequisite: course 22 or consent of instructor. Study of the genre of lyric poetry from the late Middle Ages through Renaissance, Baroque, Classical, Romantic, and Modern periods in correlation with other literary forms and the social climate of each period. Offered irregularly. GE credit: ArtHum | AH, WC, WE.—Finney

**132. The German Novelle (4)**

Lecture—3 hours; term paper. Prerequisite: course 22 or consent of instructor. Inquiry into the art of the "Novelle" through analysis of the materials and formal devices of representative authors from Goethe to Kafka. Offered irregularly. GE credit: ArtHum | AH, WC, WE.

**133. The German Drama (4)**

Lecture—3 hours; term paper. Prerequisite: course 22 or consent of instructor. Readings in the works of Germany's leading dramatists from the eighteenth century to the present day, such as Lessing, Goethe, Schiller, Kleist, Büchner, Hauptmann, Brecht. Offered irregularly. GE credit: ArtHum | AH, OL, VL, WC, WE.—Krimmer

**134. Topics in German Intellectual History (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 22 or consent of instructor. Topics in German intellectual history with materials from a number of periods, genres, and disciplines. May be repeated two times for credit when topic differs. Offered irregularly. GE credit: ArtHum | AH, WC, WE.

**141. The Holocaust and its Literary Representation (4)**

Lecture—2 hours; discussion—1 hour; term paper. Knowledge of German not required. Aesthetic representation and metaphorical transformation of the Holocaust in its human and historical perspectives. Offered irregularly. GE credit: ArtHum, Wrt | AH, WC, WE.—Rose

**142. New German Cinema (4)**

Lecture/discussion—3 hours; extensive writing. German filmmakers of the 1960s-1980s such as Fassbinder, Herzog, Syberberg, Brückner, Schlöndorf, Kluge, Wenders. Knowledge of German not required. May be repeated for credit with consent of instructor. (Same course as Film Studies 142) Offered irregularly. GE credit: ArtHum, Wrt | AH, OL, VL, WC, WE.—Fisher

**143. Language Through Media (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 22 or consent of instructor. Study of contemporary German-language news media (press, video, film, CD-ROM, internet) for insight into political and cultural developments in the German-speaking countries. Offered irregularly. GE credit: ArtHum | AH, OL, VL, WC, WE.—Arnett

**144. Marx, Nietzsche, Freud (4)**

Lecture/discussion—3 hours; term paper. Study of major texts of Marx, Nietzsche, and Freud, selected with an eye to their impact on 20th-century economics, ethics, and attitudes toward eros. Particular focus on conceptions of the self and the individual's relation to society. Offered in alternate years. (Same course as Humanities 144.) GE credit: ArtHum, Wrt | AH, WC.—Rose

**160. Love in the Middle Ages (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 22 or consent of instructor. Analysis of the phenomenon of love in selected medieval lyrical poems and romances of the twelfth and thirteenth century Blütezeit. Origins of courtly love, love and individualism, love and the Church, love and adultery. Offered irregularly. GE credit: ArtHum | AH, WC, WE.—Arnett

**168. Multiculturalism in German Literature (4)**

Lecture/discussion—3 hours; term paper or discussion—1 hour. Prerequisite: course 22 or consent of instructor. Examples of German Literature from the High Middle Ages to the present that explore the "encounter with the other" (people of color, different beliefs and cultures, and inner-German minorities). Offered irregularly. GE credit: ArtHum, Div | AH, OL, VL, WC, WE.—Arnett

**176A. Classic Weimar Cinema (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: Humanities 1. German Weimar (1919-1933) cinema. Fritz Lang, F.W. Murnau, and G.W. Pabst among others. Influence on world-wide (esp. Hollywood) film genres such as film noir, horror, science fiction, and melodrama. Not open for credit to students who have completed Humanities 176. Offered irregularly. (Same Course as Film Studies 176A.) GE credit: ArtHum, Wrt | AH, OL, VL, WC, WE.—Fisher

**185. The Age of Bismarck (4)**

Discussion—3 hours; term paper. Prerequisite: course 22 or consent of instructor. Notable literary repercussions of the zenith of Germany's international status at the time of Bismarck's Chancellorship. The poetry of Storm, the prose of Fontane, the drama of Hauptmann. Offered irregularly. GE credit: ArtHum | AH, WC, WE.

**192. Field Work in German (1-12)**

Internship—3-36 hours. Prerequisite: course 109A or consent of instructor. Total immersion program in Germany or a German speaking setting in the U.S. to further develop student proficiency in the German language. May be repeated two times or up to 12 units of credit with consent of instructor. (P/NP grading only.) Offered irregularly.

**194HA. Honors Program (3)**

Independent study—2 hours; term paper. Prerequisite: open only to majors with a 3.500 minimum GPA in at least 135 graduation units. Research of an integrative nature (in either "General" or "Area Studies Emphasis" fields of major), guided by thesis adviser chosen by student. (P/NP grading only. Deferred grading only, pending completion of course sequence.)

**194HB. Honors Program (3)**

Independent study—2 hours; term paper. Prerequisite: open only to majors with a 3.500 minimum GPA in at least 135 graduation units. Writing of Honors Thesis on topic selected by student in consultation with thesis adviser. (P/NP grading only. Deferred grading only, pending completion of course sequence.)

**197. Tutoring in German (1-4)**

Tutorial—3-12 hours. Prerequisite: consent of German Program Director. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with department courses. May be repeated up to eight units of credit. (P/NP grading only.)

**198. Directed Group Study (1-5)**

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.)

**Graduate****202. Middle High German (4)**

Discussion—3 hours; lecture—1 hour. Prerequisite: graduate standing. Outline of grammar; selections from Middle High German epic, romance, and lyric poetry.

**206. Cognitive Grammar for Applied Linguists (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing. Analysis of grammar and application of cognitive grammar to language instruction. Syntactical problems and analyses relevant to the language the student will teach. Offered irregularly.—Arnett

**210. Techniques of Literary Scholarship (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. The bibliographical, organizational, and methodological tools and resources for advanced, independent research. Offered irregularly.

**211. Concepts in Literary Theory (4)**

Seminar—3 hours. Prerequisite: graduate standing. Advanced course in concepts of literary theory and criticism. Discussion of the emergence of theoretical concepts and their impact on the understanding and appreciation of literary works. Discussion in German and English, readings in German. Offered irregularly.

**212. Contemporary Approaches to Literary Theory (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Study of contemporary theoretical approaches such as structuralism, deconstruction, feminism, Marxism/Frankfurt School, and reception theory in conjunction with the works of major authors. Offered irregularly.

**239. Narrative and Narrative Theory (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Studies, in a theoretical and literary historical context, major elements of 19th- and 20th-century narrative, such as techniques of framing, refraction, and montage; narrative perspective; mimesis; and self-consciousness. Focuses on paradigmatic prose texts alongside a spectrum of critical approaches.

**240. Forms of German Verse (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. The development of German verse from the Middle Ages to the present, with special emphasis on different techniques of text analysis and interpretation. May be repeated for credit with consent of instructor. Offered irregularly.

**241. The German Drama (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. The major forms of German drama from its origins to the middle of the twentieth century. May be repeated for credit with consent of instructor. Offered irregularly.—Finney

**242. The German Novelle (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. The major German Novellisten, with particular emphasis on the flowering of this genre in the nineteenth century. May be repeated for credit with consent of instructor. Offered irregularly.

**243. Fontane and the Rise of the Modern German Novel (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Fontane, the father of the modern German novel and the chief German representative of the European novel at its greatest, in the context of the nineteenth-century European political and social scene. Offered irregularly.

**244. Gender and Comedy (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Studies of genre and gender in German-language comedy by male and female writers from the 18th century to the present. Authors treated

include Lessing, Kleist, Büchner, Ebner-Eschenbach, Hauptmann, Hofmannsthal, Frisch, Langner, and Jelinek. Offered irregularly.—Finney

**252. The Writings of Lessing (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Study of Lessing's theory of literature with particular emphasis upon his critical attacks on French drama. Offered irregularly.

**253. Goethe (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. The Study of the origins of Goethe's thought in German Pietism, and his principal artistic, autobiographical, scientific, and philosophical works. Offered irregularly.—Krimmer

**254. Schiller (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. A critical analysis of Schiller's major works and his impact on the intellectual climate in Germany during the late eighteenth and early nineteenth centuries. Offered irregularly.—Krimmer

**255. Aesthetics in the Age of Goethe (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Emergence of aesthetic autonomy from eighteenth century normative poetics during the Age of Goethe. The shift from a model based on the imitation of nature (and the Ancients) to a new concept grounded in the individuality of aesthetic experience. Offered irregularly.

**253. Goethe (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. The Study of the origins of Goethe's thought in German Pietism, and his principal artistic, autobiographical, scientific, and philosophical works. Offered irregularly.—Krimmer

**254. Schiller (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. A critical analysis of Schiller's major works and his impact on the intellectual climate in Germany during the late eighteenth and early nineteenth centuries. Offered irregularly.—Krimmer

**260. The Poetry of Rilke (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Study of the principal motifs, myths, images, and problems in the poetry of Rainer Maria Rilke. Offered irregularly.

**261. Brecht and the Epic Theater (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. A reading of Brecht's works with emphasis on the ideas which impelled the development of new literary forms and concepts.—S. (S.) Fisher

**262. Studies in Turn-of-the-Century Culture (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Investigates literary currents in turn-of-the-century Germany and Austria against the background of contemporaneous developments in psychology, the visual arts, philosophy, and music. Authors treated include Hauptmann, Holz and Schlaf, Schnitzler, T. Mann, Wedekind, Musil, Hofmannsthal. Offered irregularly.—Finney

**285. Middle High German Literature (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Extensive reading of Middle High German texts in the original language. Examines linguistic and literary problems. May be repeated for credit when topic differs. Offered irregularly.

**288. The Renaissance and Reformation in German Literature (4)**

Seminar—3 hours; term paper. Restricted to graduate standing. The parabolic and didactic style in Germany's literature during the sixteenth century. May be repeated for credit with consent of instructor. Offered irregularly.

**289. German Literature of the Baroque (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. The "Elegantiadeal" and the varying methods used to portray it in seventeenth-century German literature. May be repeated for credit with consent of instructor. Offered irregularly.

**290. The Enlightenment in German Literature (4)**

Seminar—3 hours; term paper. Revolt against the concept of the "Elegantiadeal," and evolution of a new literature based on reason and wit. May be repeated for credit with consent of instructor. Offered irregularly.

**291. Foreign Language Learning in the Classroom (4)**

Seminar—3 hours; project. Overview of approaches to university-level foreign language instruction and the theoretical notions underlying current trends in classroom practices across commonly taught foreign languages. (Same course as French 291 and Spanish 291.)—Arnett

**292. Sentimentality and Sturm und Drang in German Literature (4)**

Seminar—3 hours. Reaction to overemphasis on Reason: theories of Hamann and Herder and works of poets such as Lenz, Leisewitz, the early Goethe and Schiller. May be repeated for credit with consent of instructor. Offered irregularly.

**293. The Classical Age of German Literature (4)**

Seminar—3 hours; term paper. Inquiry into the aesthetic and humanistic qualities of Germany's greatest literary epoch. May be repeated for credit with consent of instructor. Offered irregularly.

**294. The Romantic Period in German Literature (4)**

Seminar—3 hours; term paper. Survey of the works of early nineteenth-century authors in reaction against the age of classicism. May be repeated for credit with consent of instructor. Offered irregularly.

**295. Poetic Realism in German Literature (4)**

Seminar—3 hours; term paper. Outstanding figures in German literature between 1840 and 1890. Important phases in their developments will be treated. May be repeated for credit with consent of instructor. Offered irregularly.

**296. Twentieth-Century German Literature (4)**

Seminar—3 hours; term paper. Considers the revolt of the Hauptmann generation, Symbolism, Expressionism, and the chief currents of the contemporary scene. May be repeated for credit with consent of instructor. Offered irregularly.—Finney

**297. Special Topics in German Literature (4)**

Seminar—3 hours; term paper. Various special topics in German literature, which may cut across the more usual period and genre rubrics. May be repeated for credit when topic differs.

**298. Group Study (1-5)****299. Individual Study (1-12)**

(S/U grading only.)

**299D. Special Study for the Doctoral Dissertation (1-12)**

(S/U grading only.)

**Professional****390A. The Teaching of German (2)**

Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of new teaching assistants. (S/U grading only.)—Arnett

**390B. The Teaching of German (2)**

Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of new teaching assistants. (S/U grading only.)—Arnett

**390C. The Teaching of German (2)**

Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of new teaching assistants. (S/U grading only.)—Arnett

### 396. Teaching Assistant Training Practicum (1-4)

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

### Professional

### 400. Tutorial and Instructional Internship (1-3)

Discussion—1-3 hours. Prerequisite: graduate standing. Apprentice training in ongoing undergraduate literature courses taught by regular staff, with supplementary weekly critique sessions; intern leadership of discussion sections under staff supervision. May be repeated for credit.

## Global and International Studies

(College of Letters and Science)

The interdisciplinary minor in Global and International Studies will enable students to learn about global and international issues at UC Davis, as well as gain first-hand academic experience abroad. The minor is also designed to give recognition for upper division course work while studying abroad. However, the minor can also be completed with approved course work taken at UC Davis.

Students will be expected to work closely with an academic adviser in developing an intellectually coherent program of study. Each proposal must be approved by the Faculty Director of UC Davis Study Abroad.

The minor is overseen by a Program Committee. For more information, see <http://studyabroad.ucdavis.edu/>.

### Minor Program Requirements:

UNITS

### Global and International Studies .... 23-25

#### Arts and Humanities Emphasis:

One course from: Anthropology 4, 20, International Relations 1, Political Science 3 or Sociology 5 ..... 4  
One upper division UC Davis general course on global international studies ..... 3-4  
See program adviser for a list of approved courses.

Course cluster requirement ..... 16-17

The minor requires the selection of interrelated courses totaling a minimum of 16-17 upper division units in area and regional studies or thematic course clusters in global and international studies.

Suggested course clusters include:

(1) Country or region-specific courses: Western Europe; Russian and East/Central Europe; Asia and the Pacific; Latin and South America; Africa and the Middle East; Jewish Studies; specific countries.

or

(2) Courses clustered around a thematic field in global and international studies: people and nationalities; the individual and society, arts, language, literature and culture.

**Study Abroad and International Internships.** The course cluster requirement may be met in one of two ways: (1) completion of a minimum of 16-17 units in the course cluster emphasis by taking approved UC Davis upper division courses in the area of global/international studies and/or approved upper division courses taken while participating in UC Study Abroad or another approved study abroad program, or (2) completion of 12 units of course work in a UC Davis accredited international internship, plus UC Davis courses sufficient to total 16-17 units. Students must meet with the GIS adviser and complete a Course Cluster Worksheet to demonstrate subject interrelatedness.

**Restrictions.** No more than two courses from a single UC Davis Department may be offered in satisfaction of the minor requirements.

**Foreign Language Study.** Students are strongly encouraged to study a foreign language, particularly the language of the country in which and about which they intend to study. However, only upper division coursework may be used to fulfill requirements for the minor.

## Global Disease Biology

(College of Agricultural and Environmental Sciences)

Department of Plant Pathology

**Program Office.** 152 Hutchison Hall  
530-754-7277.

**Master Adviser.** Johan H.J. Leveau, Ph.D., Professor (*Plant Pathology*)

#### Committee in Charge

Patricia A. Conrad, D.V.M, Ph.D., Professor (*Pathology, Microbiology and Immunology*)  
Satya Dandekar, Ph.D., Professor (*Medical Microbiology and Immunology*)  
Thomas Gordon, Ph.D., Professor (*Plant Pathology*)  
David M. Rizzo, Ph.D., Professor (*Plant Pathology*)  
Dori Borjesson, D.V.M, Ph.D., Professor (*Pathology, Microbiology and Immunology*)  
Joie Watson, D.V.M, Ph.D., Professor (*Medicine and Epidemiology*)  
Michael S. Wilkes, M.D., M.P.H., Ph.D., Professor (*Internal Medicine*)

#### Faculty

Faculty includes members of the Departments of Plant Pathology, on page 513; Veterinary Medicine, School of, on page 581; Medicine, School of, on page 427.

#### The Major Program

The Global Disease Biology (GDB) major offers students the opportunity to study disease and its relationship to the health of people, animals, plants, and the environment. The program uses an integrated approach to advance student understanding of the concept(s) of disease, the societal and personal impacts of past, present and future diseases, and the science behind disease discoveries, causes, evolution, diagnosis, treatment, and prevention. The program recognizes the interconnectedness of people, animals, plants, and the environment and aims to identify and address the fundamental causes of poor health around the world. Managing global disease problems requires a multifaceted, holistic approach to address the full spectrum of human, animal, plant, and environmental health risks (also known as a One Health approach). Throughout a series of core courses, issues related to human, animal, and plant health, along with tools available to solve these problems, will be introduced to provide students with real-world scenarios in which they can apply and advance their creative and critical thinking skills. The major prepares graduates with the knowledge, leadership skills and experiences required to excel in professions associated with global health, the environment, food safety and security, biological safety and security, and health policy. For more information, see <http://gdb.ucdavis.edu/>.

**The Program.** The Global Disease Biology major provides students with broad preparatory scientific course work, global disease biology core classes, flexibility in upper division electives, and a strong research experience. Global Disease Biology core classes are intended to be transdisciplinary and focus on concepts that cut across human, animal, and plant diseases offering a unifying ecological and quantitative perspective on disease.

Students plan their chosen emphasis of study as part of a required discussion course and in consultation with their adviser. Students will draw from many

undergraduate courses currently offered on disease and health in a way that complements the core courses required for the Global Disease Biology major. The major includes a senior research project, which each student designs to bridge the disciplines of the major.

**Internships and Career Alternatives.** The program and interests of each student in solving societal problems guides students to a range of internship and career choices. On and off-campus internship opportunities are available in research laboratories, in field situations, with governmental agencies, with private industry, and in international programs. A degree in Global Disease Biology prepares students for careers in research, teaching, governmental regulation, health care industry, or agriculture (food safety/ food security) as each relates to disease and health of people, animals, and plants. Students in the major gain research experience and may choose to continue their training at the graduate or professional level in a variety of biological disciplines. Careers in medicine, veterinary medicine, and plant pathology are open to Global Disease Biology majors.

#### B.S. Major Requirements:

UNITS

#### Preparatory Subject Matter ..... 60-62

Global Disease Biology 90 .....	1
Science and Society 13 .....	3
Biological Sciences 2A-2B-2C .....	15
Chemistry 2A-2B-2C, and 8A-8B or 118A-118B .....	21-23
General Physics 7A-7B .....	8
Mathematics 17A-17B-17C .....	12

#### Depth Subject Matter ..... 46-49

Biological Sciences 101, 105 .....	7
Evolution and Ecology 100 .....	4
Microbiology 101 .....	5
One course from Statistics 13, 100; Plant Sciences 120 .....	4
Pathology, Microbiology & Immunology 129Y .....	3
VM Medicine and Epidemiology 158 .....	3
Global Disease Biology 101, 102 .....	8
Two courses from Plant Pathology 120; Pathology, Microbiology & Immunology 127, 128; Microbiology 162; Entomology 153, 156/156L; Global Disease Biology 103 .....	6-9
Global Disease Biology 187 .....	3
Global Disease Biology 189 .....	3

#### Restricted Electives ..... 25

Focused specialty upper division courses as outlined in the student's major proposal (from course 187) with approval of an adviser.

#### Total Units for the Degree ..... 125-134

#### Recommended

Biological Sciences 101D .....	1
Global Disease Biology 189D .....	1

#### Minor Program Requirements:

A minor in Global Disease Biology may complement student's major program. Some courses have required prerequisites not included as part of the minor, and students should plan accordingly.

UNITS

#### Global Disease Biology ..... 20-22

Science and Society 13 .....	3
Pathology, Microbiology & Immunology 129Y .....	3
VM Medicine and Epidemiology 158 .....	3
Global Disease Biology 101, 102 .....	8
One course from: Plant Pathology 120; Pathology, Microbiology & Immunology 127, 128; Microbiology 162; Entomology 153, 156/156L; Global Disease Biology 103 .....	3-5

#### Minor Program Adviser: TBA

Advising Center for the minor is located in 152 Hutchison Hall 530-754-7277.

## Courses in Global Disease Biology (GDB)

### Lower Division

#### 90. Introduction to Global Disease Biology (1)

Seminar—1 hour; fieldwork—1 hours. Introduction to the Global Disease Biology major, research and internship opportunities, and potential career paths in human, animal, and plant health. Communication, ethics and the nature of science. (P/NP grading only.)—F. (F.) Rizzo

### Upper Division

#### 101. Epidemiology (4)

Lecture—2 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: Science and Society 13; Biological Science 2A, 2B, 2C; Statistics 13, 100 or Plant Sciences 120. Principles and practice of epidemiology as applied to human, animal, and plant populations and the environment in which these populations co-exist. Quantitative analysis of both infectious and non-infectious disease. Inter-dependence between epidemiological analysis, decision-making and policy formulation will be highlighted. GE credit: SciEng | SE, QL.—W. (W.) McRoberts, Papageorgiou

#### 102. Disease Intervention and Policy (4)

Lecture—3 hours; discussion—1 hour; project. Prerequisite: course 101; Science and Society 13; Biological Sciences 2A, 2B, 2C; Pathology, Microbiology and Immunology 129Y; VM-Medicine and Epidemiology 158. Examination of the prevention and treatment of diseases affecting humans, animals, and plants. Case studies will illustrate the merits of a unified approach to promoting health at local, regional, and global scales. GE credit: SciEng | OL, SE, SL.—S. (S.) Rizzo

#### 103. The Microbiome of People, Animals, and Plants (3)

Lecture—3 hours. Prerequisite: Biological Science 2A, 2B, 2C. Examination of the structure and function of microbial communities that live inside and on host organisms. Introduction to general concepts of the microbiome and microbiota, and their relationship to host health and disease. GE credit: SciEng | SE, SL.—F. (F.) Cook, Leveau

#### 187. Global Disease Biology Seminar (3)

Seminar—1 hour; discussion—1 hour; term paper. Prerequisite: junior standing, course 90, Science and Society 13. Open to Global Disease Biology majors. Seminar leading to development of the research proposal and academic plan for the Global Disease Biology major.—F. (F.)

#### 189. Global Disease Biology Senior Research (3)

Independent study—3 hours. Prerequisite: senior standing, courses 90, 187; (course 189D concurrently the first time course 189 is taken), Science and Society 13. Restricted to Global Disease Biology majors only. Capstone research experience for the Global Disease Biology major. Project may be experimental, library research, or some other creative activity. May be repeated one time for credit while research is conducted over two quarters; second quarter used to finish research paper.—F, W, S, Su. (F, W, S, Su.)

#### 189D. Global Disease Biology Research Discussion (1)

Discussion—1 hour. Prerequisite: courses 90, 187, Science and Society 13; course 189 required concurrently. Restricted to junior standing; Global Disease Biology majors only. Course helps prevent or solve problems during the students' research activity. Independent advising and assistance on research proposal. (P/NP grading only.)—F, W, S. (F, W, S.)

## Greek

See Classics, on page 211.

## Health Informatics (A Graduate Group)

### Formerly Medical Informatics (A Graduate Group)

Michael Hogarth, M.D., Professor  
(Department of Internal Medicine and Department of Pathology and Laboratory Medicine)

**Group Office:** UC Davis Health System

Health Informatics Program  
2450 48th St., Suite 2800, Sacramento, CA 95817  
916-734-8710; [healthinformatics@ucdavis.edu](mailto:healthinformatics@ucdavis.edu)

### Faculty

Nicholas Anderson, Ph.D., Assistant Professor  
(Pathology and Laboratory Medicine)

Aaron Bair, M.D., M.S.C., Associate Professor  
(Emergency Medicine)

Matt Bishop, Ph.D., Professor (Computer Science)

Dariusz Borys, M.D., Assistant Professor  
(Emergency Medicine)

Robert Cardiff, M.D., Ph.D., Professor  
(Pathology and Laboratory Medicine)

Mark Carroll, M.P.H., Health Sciences Assistant Clinical Professor (Pathology and Laboratory Medicine)

Mary Christopher, D.V.M., Ph.D., Professor  
(Pathology, Microbiology, and Immunology)

Cristina Davis, Ph.D., Assistant Professor  
(Mechanical and Aerospace Engineering)

Fred Gorin, M.D., Ph.D., Professor (Neurology)  
Bernd Hamann, Ph.D., Professor  
(Computer Science)

Calvin Hirsch, M.D., F.A.C.P., Professor  
(Internal Medicine and Public Health Sciences)

Anthony Jerant, M.D., Associate Professor  
(Family and Community Medicine)

Hershon Johl, M.D., Associate Physician Diplomate (Internal Medicine)

Karnijit Johl, M.D., Ph.D., F.A.C.P., Associate Clinical Professor of Medicine (Internal Medicine)

Tae Yoon Kim, Ph.D., R.N., Associate Professor  
(Nursing)

Patrice Koehl, Ph.D., Associate Professor  
(Computer Science)

Krish Krishnan, Ph.D., Associate Professor  
(Pathology and Laboratory Medicine)

Richard Levenson, M.D., Professor  
(Pathology and Laboratory Medicine)

Scott MacDonald, M.D., Associate Physician  
(Internal Medicine)

James Marcin, M.D., M.P.H., Associate Professor  
(Pediatrics)

Thomas Nesbitt, M.D., M.P.H., Professor  
(Family and Community Medicine)

Hien Nguyen, M.D., M.A.S, Assistant Professor  
(Infectious Diseases)

Alberto Odor, M.D., Adjunct Professor  
(Nursing)

Sean Peisert, Ph.D., Assistant Adjunct Professor  
(Computer Science)

Brad Pollock, M.P.H., Ph.D., F.A.C.E., Professor  
(Public Health Science)

Jason Roof, M.D., Assistant Clinical Professor  
(Psychiatry)

J. Anthony Seibert, Ph.D., Professor (Radiology)  
Hendry Ton, M.D., M.S., Associate Professor  
(Psychiatry)

Xiaowei Yang, Ph.D., Assistant Professor  
(Biostatistics)

Peter Yellowlees, M.B.B.S., M.D, Professor  
(Psychiatry)

Heather Young, Ph.D., R.N., G.N.P., F.A.A.N., Associate Vice Chancellor (Nursing)

### Emeriti Faculty

Richard Walters, Ph.D., Professor Emeritus  
(Computer Science)

**Graduate Study:** The Group currently offers an M.S. degree in Health Informatics. The program is primarily designed for clinicians (M.D., D.O., D.V.M., V.M.D., M.P.H., Pharm.D., R.N., others) and healthcare IT professionals with Bachelor's degree.

The course of study provides research-oriented training that spans the use of computer systems in medicine today, including methods for clinical data acquisition, storage, and retrieval, the development, use and implementation of the electronic medical record, management of clinical data, and the use of medical decision support systems. A research project and thesis are mandatory degree requirements.

**Preparation.** The Group encourages applications from clinicians and healthcare IT professionals who have had experience in the manipulation of clinical information. Basic qualifications include an advanced degree in a health-related field or the equivalent in work experience. Proof of proficiency in a programming language is required. Applicants with extensive computer science or information technology background but little knowledge of clinical information would need to gain considerable practical experience in dealing with clinical information to be competitive in applying to the program.

**Graduate Advisors.** M. Carroll (Pathology and Laboratory Medicine)

## Courses in Health Informatics (MHI)

### Graduate

#### 202. Computer-Based Patient Records (4)

Lecture/discussion—3 hours; discussion—1 hour. Prerequisite: current enrollment within the Health Informatics graduate program or consent of instructor. Introduction and overview of computer-based clinical record systems. Topics include data modeling, health system standards and terminologies; security, privacy and confidentiality; workflow modeling; data visualization; legal; decision support; public health; and evidence-based practice.—S. (S.) Odor

#### 207. Decision Support Systems (4)

Lecture/discussion—2 hours. Prerequisite: consent of instructor. Explores decision support systems for medical application. Topics include medical decision making, uncertainty, review of existing decision support systems, knowledge engineering, data mining, and knowledge based systems.—W. (W.) Greene

#### 208. Medical Informatics in Web-Based Enterprise Computing (4)

Lecture—2 hours; discussion—2 hours. Introduction to the decision making processes and technologies that are involved in developing Web-based distributed enterprise applications in medicine. Focus on the Informatician's role as a team member.—S. (S.) Carroll

#### 209. Data Acquisition and Analysis (4)

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Examines the nature, acquisition, and analysis of medical data. Data ranges from signals of electrical potentials, sounds, text, images (still and motion), and data from nucleic acid and protein expression and sequencing instruments.—F. (F.) Hogarth

#### 210. Introduction to Health Informatics (4)

Lecture—3 hours; discussion—1 hour. Overview course to give the student a broad exposure to the field of Health Informatics. Topics covered include, but are not limited to, networking, information systems, coding, HL7, Security, and HIPPA.—F. (F.) Hogarth

#### 211V. Telemedicine (4)

Web virtual lecture—3 hours; web electronic discussion—1 hour. Issues for the development and maintenance of a successful telemedicine program with focus on strategic planning, clinical applications, project management, risk management and legal issues; reimbursement and contracting; human resources and program sustainability.—S. (S.) Yellowlees

#### 212. Computer Security in Health Informatics (4)

Lecture—3 hours; project. Prerequisite: course 210; 202; 209. Critical thinking about basic concepts in computer security and privacy. How the computer

security and privacy impact health informatics, ranging from electronic health records to telemedicine to remote, virtual surgery.—F. (F.) Peisert

### **215. Beginning and Intermediate Programming in M (MUMPS) (3)**

Lecture—3 hours. Project-oriented approach to fundamentals of programming in ANSI Standard M (MUMPS) language. Basic syntax, Hierarchical file structure; arrays and string subscripts, indirection and extrinsic functions. (S/U grading only.)

### **289A. Special Topics in Medical Informatics; Data Acquisition (1-5)**

Lecture; laboratory. Prerequisite: consent of instructor. Special topics in Data Acquisition. May be repeated for credit when topic differs.

### **289B. Special Topics in Health Informatics; Seminars in Clinical Translational Informatics (1-5)**

Seminar—1 hour. Seminars in current clinical translational informatics research topics. Guest presenters and faculty led discussion.—F, W, S. (F, W, S.) Anderson, Nicholas

### **289F. Database and Knowledge Management (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Class size limited to 20 students. Course objectives include understanding the informatics techniques for data capture, information management, and knowledge generation that a student will use throughout their career. May be repeated for credit.—W (W.) Hogarth

### **289G. Special Topics in Health Informatics; Biostatistics (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: consent of instructor. Special topics in Biostatistics. Evaluation Methods and Statistics in Biomedical Informatics. Research design and analysis with special emphasis on Biomedical Informatics.—F, S. (F, S.) Odor

### **289H. Modeling Biological Systems (4)**

Lecture—3 hours; laboratory—1 hour. Class size limited to 20 students. Create awareness of how modern computer graphics have led to VR-Sim-Rob applications, and how they are modifying the teaching of medicine and in some cases the diagnosis and treatment of patients.—W. (W.) Odor

### **290. Seminar in Medical Informatics (1)**

Seminar—1 hour. Restricted to 20 students. Discussion of current graduate research and topics in Health Informatics. Oral presentations of individual study. (S/U grading only.)—F, W, S. (F, W, S.) Levenson

### **299. Research in Health Informatics (1-12)**

Independent research in Health Informatics. (S/U grading only.)—F, W, S. (F, W, S.)

## **Hebrew**

See Classics, on page 211.

## **Hindi**

See Classics, on page 211.

## **History**

(College of Letters and Science)

**Department Office.** 2216 Social Sciences and Humanities Building  
530-752-9241; <http://history.ucdavis.edu>

### **Faculty**

Ali Anooshahr, Ph.D., Associate Professor  
Mario Biagioli, Ph.D., Professor  
David Biale, Ph.D., Professor  
*UC Davis Prize for Teaching and Scholarly Achievement*

Beverly Bossler, Ph.D., Professor  
Ian Campbell, Ph.D., Assistant Professor  
Diana Davis, Ph.D., Professor  
Corrie Decker, Ph.D., Associate Professor  
Gregory Downs, Ph.D., Associate Professor  
Edward Dickinson, Ph.D., Professor  
Omnia El Shakry, Ph.D., Associate Professor  
A. Katie Harris, Ph.D., Associate Professor  
Ellen Hartigan-O'Connor, Ph.D., Associate Professor  
Quinn Javers, Ph.D., Assistant Professor  
Rachel Jean-Baptiste, Ph.D., Associate Professor  
Ari Kelman, Ph.D., Professor  
Kyu H. Kim, Ph.D., Associate Professor  
Justin Leroy, Ph.D., Assistant Professor  
Lisa Materson, Ph.D., Associate Professor  
Sally McKee, Ph.D., Professor  
Susan G. Miller, Ph.D., Professor  
Kathryn S. Olmsted, Ph.D., Professor

*Academic Senate Distinguished Teaching Award*  
Lorena Oropeza, Ph.D., Associate Professor  
Eric Rauchway, Ph.D., Professor

*Academic Senate Distinguished Teaching Award*  
Andrés Reséndez, Ph.D., Professor  
Michael Saler, Ph.D., Professor

*Academic Senate Distinguished Teaching Award*  
Marian Schlotterbeck, Ph.D., Assistant Professor  
Sudipta Sen, Ph.D., Professor

John Smolenski, Ph.D., Associate Professor  
Stylianos Spyridakis, Ph.D., Professor

*Academic Senate Distinguished Teaching Award*  
Rachel St. John, Ph.D., Associate Professor  
Daniel Stolzenberg, Ph.D., Associate Professor

Kathleen Stuart, Ph.D., Associate Professor  
Baki Tezcan, Ph.D., Associate Professor  
Cecilia Tsu, Ph.D., Associate Professor  
Charles Walker, Ph.D., Professor

*Academic Senate Distinguished Teaching Award*  
Louis S. Warren, Ph.D., Professor  
Adam Zientek, Ph.D., Assistant Professor

### **Emeriti Faculty**

Arnold J. Bauer, Ph.D., Professor Emeritus  
Robert Borgen, Ph.D., Professor Emeritus  
Cynthia L. Brantley, Ph.D., Professor Emerita  
David Brody, Ph.D., Professor Emeritus  
Joan Cadden, Ph.D., Professor Emerita  
Daniel H. Calhoun, Ph.D., Professor Emeritus  
Robert O. Crumney, Ph.D., Professor Emeritus  
Manfred P. Fleischer, Ph.D., Professor Emeritus  
William W. Hagen, Ph.D., Professor Emeritus  
Thomas H. Holloway, Ph.D., Professor Emeritus  
Norma B. Landau, Ph.D., Professor Emeritus  
Susan L. Mann, Ph.D., Professor Emerita  
Ted W. Margadant, Ph.D., Professor Emeritus  
Barbara Metcalf, Ph.D., Professor Emerita  
Don C. Price, Ph.D., Professor Emeritus  
Ruth E. Rosen, Ph.D., Professor Emerita

*Academic Senate Distinguished Teaching Award*  
Alan S. Taylor, Ph.D., Professor Emeritus  
*UC Davis Prize for Teaching and Scholarly Achievement*

Richard N. Schwab, Ph.D., Professor Emeritus  
Wilson Smith, Ph.D., Professor Emeritus  
Clarence Walker, Ph.D., Professor Emeritus

*UC Davis Prize for Teaching and Scholarly Achievement*

F. Roy Willis, Ph.D., Professor Emeritus  
*UC Davis Prize for Teaching and Scholarly Achievement*

### **The Major Program**

The History major develops critical intelligence and fosters an understanding of ourselves and our world through the study of the past—both the “deep past” and the more recent past.

**The Program.** A student electing a major in History may complete Plan I or Plan II. Plan I enables students to receive a broad education in histories of several geographic areas. Plan II encourages interested students, including those preparing for graduate work in history, to enroll in a seminar, to undertake independent work, and to study the history of historical thought as part of the major. Students preferring more active engagement in research and writing are encouraged to follow Plan II.

**Career Alternatives.** A degree in history is excellent preparation for a professional career such as teaching, law, journalism, public administration, or business management. Professional schools in these and related fields (including the health professions) are looking for students who can weigh conflicting evidence, evaluate alternative courses of action or divergent points of view, and express conclusions logically in everyday language. These analytical skills are stressed in history classes, and their mastery gives the history student a solid preparation for subsequent training in a specialized career.

### **A.B. Major Requirements:**

UNITS

#### **Preparatory Subject Matter (Plan I or II)..... 20**

Five lower division courses chosen from the following six fields, including at least two from one field, one from a second field, and one from a third field. The fifth course can be taken from any field ..... 20

- (a) African and Middle East History: History 6, 15
- (b) Asian History: History 6, 8, 9A, 9B
- (c) European History: History 3, 4A, 4B, 4C
- (d) Latin American History: History 7A, 7B, 7C
- (e) U.S. History: History 17A, 17B, 72A, 72B
- (f) World History: History 10A, 10B, 10C

#### **Depth Subject Matter—Plan I: General History ..... 40-41**

Four upper division courses from one of the fields of concentration listed below ..... 16

Two upper division courses from one of the other fields of concentration listed below ..... 8

Two upper division courses from a field or fields other than those chosen to satisfy the two preceding requirements ..... 8

One additional upper division course chosen from any of the fields ..... 4

One course from the following: History 101 or 102 or 103 (in field of concentration) ..... 4-5

One of the courses taken to fulfill the above requirements must deal with pre-modern history.

#### **Total Units for the Major—Plan I: General History ..... 60-61**

#### **Depth Subject Matter—Plan II: Research Focus ..... 42**

Four upper division courses from one of the fields of concentration listed below. Include a two-quarter sequence of courses ..... 16

Three upper division courses from one of the other fields listed ..... 12

History 101 ..... 5

History 102 in field of concentration (in exceptional circumstances, a student may, with the permission of an adviser, take the seminar in another field) ..... 5

History 103 in field of concentration ..... 4

One of the courses taken to fulfill the above requirements must deal with pre-modern history.

#### **Total Units for the Major—Plan II: Research Focus ..... 62**

#### **Fields of Concentration**

- (a) Europe: History 102A, 102B, 102C, 102D, 102E, 102F, 102I, 102P, 102X, 109A, 109B, 110A, 111B, 111C, 112A, 112B, 120, 121A, 121B, 121C, 122, 125, 130A, 130B, 130C, 131A, 131B, 131C, 132, 133, 134A, 135A, 135B, 136, 138A, 138B, 138C, 139A, 139B, 140, 141, 142A, 142B, 143, 144A, 144B, 145, 146A, 146B, 147A, 147B, 147C, 148A, 148B, 148C, 149, 151A, 151B, 151C, 151D, 160.
- (b) United States History: History 102K, 102L, 102M, 102X, 120, 169A, 169B,

170A, 170B, 170C, 171A, 171B, 171D, 172, 173, 174A, 174B, 174C, 174D, 175, 176A, 176B, 177A, 177B, 178A, 178B, 179, 180A, 180B, 180C, 181, 182, 183A, 183B, 184, 185A, 185B, 188, 189.

(c) *Asian History*: History 102G, 102H, 102N, 102Q, 102R, 102X, 109A, 109B, 110, 110A, 111A, 112A, 112B, 112C, 113, 120, 190A, 190B, 190C, 190D, 191A, 191B, 191C, 191D, 191E, 191F, 193A, 193B, 193C, 194A, 194B, 194C, 194D, 194E, 195B, 196A, 196B.

(d) *African History*: 102O, 102X, 109A, 109B, 110, 110A, 112C, 115A, 115B, 115C, 115D, 115E, 115F, 116.

(e) *Latin American History*: History 102J, 102X, 109A, 109B, 110, 110A, 160, 162, 163A, 163B, 164, 165, 166A, 166B, 167, 168, 169A, 169B.

(f) Within broad fields, a student may wish to concentrate some of the courses on a particular area or period, such as China or Great Britain or Medieval Europe. Special approval is not required.

**Major Advisers.** See the department's website for updated information.

**History and Philosophy of Science.** Courses from the History and Philosophy of Science program may count toward the History major. History and Philosophy of Science 130A fulfills upper division requirements in the field of pre-industrial Europe. History and Philosophy of Science 130B, 150, and 180 fulfill upper division requirements in either the U.S. or Modern Europe field.

Students can create a field in the History of Science upon consultation with a faculty adviser. They may draw upon the relevant History courses (History 85, 135A, 135B, 139A, 139B, 185A, and 185B) as well as History and Philosophy of Science offerings to do so.

Consult the History and Philosophy of Science program for a more detailed description of course offerings this area and the minor in History and Philosophy of Science.

### Minor Program Requirements:

The minor in History consists of five upper division courses chosen so that at least three courses are in one field and at least one course is in another field. The two fields shall be chosen from among those defined in the catalog for the major. However, students may also, in consultation with and with the authorization of a faculty adviser, define other thematic fields.

#### UNITS

#### History ..... 20

At least 20 units of upper division history courses ..... 20

Examples of minor with thematic emphasis: Pre-Law (British and American Political and Constitutional Development); The Twentieth Century; The History of Ideas in Society.

**Minor Advisers.** Same as major advisers.

**Honors and Honors Program.** A student becomes eligible for graduation with honors by meeting the minimum GPA (usually 3.500) and course requirements established by the College of Letters and Science. To qualify for high or highest honors, students must also complete the History Department honors program with a GPA of 3.500 or above and write a thesis that meets the criteria for high honors or highest honors. Students apply to participate in the department honors program during the latter part of their junior year. Admission to the program is based on GPA, a thesis proposal, examples of previous writing, and the recommendation of a faculty member who is willing to sponsor the student's project, interviews, and faculty recommendations. Students admitted into the program must complete the History 104A, 104B, 104C sequence of honors courses, which requires the completion of a senior honors thesis. Students who anticipate seeking admission to the honors program are urged to

complete at least one History 102 (undergraduate seminar) before the end of their junior year. Interested students are urged to consult with faculty in their field early in their junior year. Students may follow either Plan I or Plan II described above, and may substitute History 104B and 104C for any courses in their program other than History 102.

Students who anticipate pursuing graduate work in history or a teaching credential, and who do not wish to opt for the research emphasis embodied in the honors program, are encouraged to select Plan II of the major.

**Study Abroad and the History Major.** The department strongly encourages interested students to pursue their studies abroad. While there are no specific required courses or prerequisites, students are urged to take at least one history course that touches upon the geographic area where they plan to study abroad before departing. To receive a history degree from UC Davis, students must complete at least 18 upper division units in the history major at UC Davis (which can also include History 101, 102, 103). The remaining major requirements can be fulfilled abroad provided that (a) the course should be evaluated as at least four UC Davis units, (b) the course should be considered upper division by the standards set forth by the UC Davis Study Abroad Program, and (c) the course should be in the field of History. Students may present copies of the course work, syllabus, and writing assignments to the department's liaison person with the Study Abroad office for approval.

Note: students who wish to receive credit for courses taken abroad under programs other than UC Davis Study Abroad may petition the Undergraduate Program Committee to do so.

**Teaching Credential Subject Representative.** See the Teaching Credential/M.A. Program on page 124.

**Preparing for Careers in Teaching.** History majors can pursue rewarding careers in teaching. To ensure your undergraduate coursework prepares you for a subject matter competency test, please contact the History Project at 530-752-4383 or <http://historyproject.ucdavis.edu/>.

**Graduate Study.** The Department of History offers programs of study and research leading to the M.A. and Ph.D. degrees in history. Detailed information may be obtained by contacting the Graduate Adviser.

**Graduate Advisers.** See the department's website for updated information.

**American History and Institutions.** This University requirement can be satisfied by passing any one of the following courses in History: 17A, 17B, 72A, 72B, 170A, 170B, 170C, 171A, 171B, 172, 173, 174A, 174B, 174C, 174D, 175, 176A, 176B, 177A, 177B, 178A, 178B, 180A, 180B, 181, 183A, 183B, 184, 189. The upper division courses may be used only with the consent of the instructor; see also under University requirements.

### Courses in History (HIS)

#### Lower Division

##### 1. Introduction to History (2)

Lecture—1 hour; discussion—1 hour. Introduction to history, its key methodologies, writing tasks, and research practices. Examination of the development of history as an academic discipline; ethics in historical research. Topical focus changes regularly. GE credit: SS, WC, WE.

##### 3. Cities: A Survey of World Cultures (4)

Lecture—3 hours; lecture/discussion—1 hour. Survey of urban world cultures, focusing on up to ten cities selected by the instructor. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

##### 4A. History of Western Civilization (4)

Lecture—3 hours; discussion—1 hour. Growth of western civilization from late antiquity to the Renaissance. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

#### 4B. History of Western Civilization (4)

Lecture—3 hours; discussion—1 hour. History of western civilization from the Renaissance to the Eighteenth Century. GE credit: ArtHum or SocSci, Wrt | AH or SS, VL, WC, WE.

#### 4C. History of Western Civilization (4)

Lecture—3 hours; discussion—1 hour. Development of Western Civilization from the Eighteenth Century to the present. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

#### 6. Introduction to the Middle East (4)

Lecture—3 hours; discussion—1 hour. Survey of the major social, economic, political and cultural transformations in the Middle East from the rise of Islam (c. 600 A.D.) to the present, emphasizing themes in religion and culture, politics and society. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### 7A. History of Latin America to 1700 (4)

Lecture—3 hours; discussion—1 hour. Introduction to the history of Spanish and Portuguese America from the late pre-Columbian period through the initial phase and consolidation of a colonial regime (circa 1700). Topics include conquest, colonialism, racial mixture, gender, and labor systems. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.—F. (F.)

#### 7B. History of Latin America, 1700-1900 (4)

Lecture—3 hours; discussion—1 hour. Latin America from colony to republic. The nature of Iberian colonialism, the causes for independence, the creation of nation states, the difficulties in consolidating these nations, and the rise of Liberalism and export economics in the nineteenth century. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.—W. (W.)

#### 7C. History of Latin America, 1900-present (4)

Lecture—3 hours; discussion—1 hour. Latin America since the beginning of the 20th century. Themes include export economies, oligarchic rule, crises of depression and war, corporatism, populism revolution and reform movements, cultural and ethnic issues, U.S.-Latin American relations, neo-liberal restructuring. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.—S. (S.)

#### 8. History of Indian Civilization (4)

Lecture—3 hours; discussion—1 hour; written reports. Survey of Indian civilization from the rise of cities (ca. 2000 B.C.) to the present, emphasizing themes in religion, social and political organization, and art and literature that reflect cultural interaction and change. GE credit: ArtHum or SocSci, Div | AH or SS, WC, WE.

#### 9A. History of East Asian Civilization (4)

Lecture—3 hours; discussion—1 hour. Surveys traditional Chinese civilization and its modern transformation. Emphasis is on thought and religion, political and social life, art and literature. Perspectives on contemporary China are provided. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### 9B. History of East Asian Civilization (4)

Lecture—3 hours; discussion—1 hour. Surveys traditional Japanese civilization and its modern transformation. Emphasis is on thought and religion, political and social life, art and literature. Perspectives on contemporary Japan are provided. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### 10A. World History to 1350 (4)

Lecture—3 hours; discussion—1 hour. Historical examination of the changing relationship of human societies to one another and to their natural settings through the year 1350, with particular attention to long-term trends and to periodic crises that reshaped the links of culture and nature on a global scale. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

**10B. World History, c. 1350-1850 (4)**

Lecture—3 hours; discussion—1 hour. Major topics in world history from the 14th century to the beginning of the 19th century. Topics will vary but may include oceans as systems of human communication and conflict; the global consequences of “industrial revolutions” in Europe and Asia, etc. GE credit: ArtHum or SocSci | ACGH, AH or SS, WC, WE.

**10C. World History III (4)**

Lecture—3 hours; discussion—1 hour. Major topics from world history of the 19th and 20th centuries, emphasizing the rise and fall of Western colonial empires; Cold War and the superpowers; the spread of the nation-states; and process of globalization. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

**11. History of the Jewish People in the Modern World (4)**

Lecture—3 hours; discussion—1 hour. Histories and cultures of the Jews since 1492. Topics include: the making of Jewish diasporas, roots of antisemitism, the Holocaust in images and texts, changing ideas of the self, Jews in America, contemporary visions of the Jewish past. Offered in alternate years. GE credit: ArtHum | AH, DD, VL, WC, WE.

**12. Food and History (4)**

Lecture—3 hours; discussion—1 hour. Survey of the ways humans have fed themselves from the dawn of humanity to the present. Transformation of plants and animals into food, cooking into cuisine, and ceremony into etiquette. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, OL, VL, WC, WE.—McKee, Resendez

**15. Introduction to African History (4)**

Lecture—3 hours; discussion—1 hour. Examination of the long-range historical context as background to current conditions in Africa. Includes the early development of African civilizations, the slave trade and its abolition, 20th century colonization, and African independent states. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

**17A. History of the United States (4)**

Lecture—3 hours; discussion—1 hour. The experience of the American people from the Colonial Era to the Civil War. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.—F, W, S. (F, W, S.)

**17B. History of the United States (4)**

Lecture—3 hours; discussion—1 hour. The experience of the American people from the Civil War to the end of the Cold War. Not open for credit to students who have completed course 17C. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.—F, W, S. (F, W, S.)

**72A. Women and Gender in America, to 1865 (4)**

Lecture—3 hours; discussion—1 hour. History of women and gender in America through 1865, emphasizing intersections of gender, race, class, and sexuality. Topics include interracial marriage, slavery, witchcraft, meanings of motherhood, war, domestic labor, moral reform, women's rights, migrations, the effects of commercialization and industrialization. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.

**72B. Women and Gender in America, 1865-Present (4)**

Lecture—3 hours; discussion—1 hour. History of women and gender in America since 1865, emphasizing intersections of gender, race, class, and sexuality. Covers emancipation, migration, immigration, war, media, same-sex and opposite-sex relationships, and the birth control, suffrage, labor, civil rights, feminist, and anti-feminist movements. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.

**80. The History of the United States in the Middle East (2)**

Lecture/discussion—2 hours. History of the United States in the Middle East from 1900 to the present. Examination of U.S. foreign relations toward the

Middle East, their regional ramifications and domestic repercussions. GE credit: ArtHum or SocSci | ACGH, AH or SS, WC, WE.

**85. Nature, Man, and the Machine in America (4)**

Seminar—4 hours; term paper. Limited enrollment. History of the attitudes and behavior of Americans toward their natural environment and their technology, from colonial times to the present. No final examination. Offered irregularly. GE credit: ArtHum or SocSci | AH or SS, WE.

**98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.) Offered irregularly.

**99. Special Study for Undergraduates (1-5) (P/NP grading only.)**

Offered irregularly.

**Upper Division****101. Introduction to Historical Thought and Writing (5)**

Lecture/discussion—4 hours; term paper. Study of the history of historical thought and writing, analysis of critical and speculative philosophies of history and evaluation of modes of organization, interpretation, and style in historical writing. Offered in alternate years. GE credit: WE.

**102A. Undergraduate Proseminar in History; Ancient (5)**

Seminar—3 hours; term paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Ancient. May be repeated for credit.

**102B. Undergraduate Proseminar in History; Medieval (5)**

Seminar—3 hours; term paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Medieval. May be repeated for credit. Offered in alternate years.

**102D. Undergraduate Proseminar in History; Modern Europe to 1815 (5)**

Seminar—3 hours; term paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Modern Europe to 1815. May be repeated for credit.

**102E. Undergraduate Proseminar in History; Europe Since 1815 (5)**

Seminar—3 hours; term paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Europe since 1815. May be repeated for credit.

**102F. Undergraduate Proseminar in History; Russia (5)**

Seminar—3 hours; term paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Russia. May be repeated for credit. Offered in alternate years.

**102G. Undergraduate Proseminar in History (5)**

Seminar—3 hours; term paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. China to 1800. May be repeated for credit. Offered in alternate years.

**102H. Undergraduate Proseminar in History; China Since 1800 (5)**

Seminar—3 hours; term paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. China since 1800. May be repeated for credit. Offered in alternate years.

**102I. Undergraduate Proseminar in History; Britain (5)**

Seminar—3 hours; term paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Britain. May be repeated for credit. Offered in alternate years.

**102J. Undergraduate Proseminar in History; Latin America Since 1810 (5)**

Seminar—3 hours; term paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Latin America since 1810. May be repeated for credit. Offered in alternate years.

**102K. Undergraduate Proseminar in History; American History to 1787 (5)**

Seminar—3 hours; term paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. American History to 1787. May be repeated for credit. Offered in alternate years.

**102L. Undergraduate Proseminar in History; United States, 1787-1896 (5)**

Seminar—3 hours; term paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. United States, 1787-1896. May be repeated for credit. Offered in alternate years.

**102M. Undergraduate Proseminar in History; United States Since 1896 (5)**

Seminar—3 hours; term paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. United States since 1896. May be repeated for credit. Offered in alternate years.

**102N. Undergraduate Proseminar in History; Japan (5)**

Seminar—3 hours; term paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Japan. May be repeated for credit. Offered in alternate years.

**102O. Undergraduate Proseminar in History; Africa (5)**

Seminar—3 hours; term paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Africa. May be repeated for credit. Offered in alternate years.

**102P. Undergraduate Proseminar in History; Christianity and Culture in Europe, 50-1850 (5)**

Seminar—3 hours; term paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Christianity and Culture in Europe, 50-1850. May be repeated for credit. Offered in alternate years.

**102Q. Undergraduate Proseminar in History; India (5)**

Seminar—3 hours; term paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. India. May be repeated for credit. Offered in alternate years.

**102R. Undergraduate Proseminar in History; Muslim Societies (5)**

Seminar—3 hours; term paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Muslim Societies. May be repeated for credit. Offered in alternate years.

**102S. Undergraduate Proseminar in History; Education Abroad Program (5)**

Seminar—3 hours; term paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history.

topics in the various fields of history. Education Abroad Program. May be repeated for credit. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt | AH or SS, WE.

#### **102X. Undergraduate Proseminar in History (5)**

Seminar—3 hours; term paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Comparative History, selected topics in cultural, political, economic, and social history that deal comparatively with more than one geographic field. May be repeated for credit.

#### **103. Topics in Historical Research (4)**

Discussion—3 hours; individual consultation with instructor; term paper. Prerequisite: consent of instructor. Individual research resulting in a research paper on a specific topic in one of various fields of history. May be repeated for credit. Offered irregularly. GE credit: WE.

#### **104A. Introduction to Historical Research and Interpretation (4)**

Seminar—3 hours; term paper. Prerequisite: acceptance into History Department Honors Program. Directed reading and research aimed at preparing students to select appropriate topics and methodologies for a senior honors essay and to situate their topics within a meaningful, broad context of historical interpretations. Culminates in the submission of a full prospectus for an honors essay. GE credit: WE. —F. (F.) Anooshahr

#### **104B. Honors Thesis (4)**

Tutorial—4 hours. Prerequisite: course 104A. Research in preparation of a senior honors thesis under the direction of a faculty adviser. (Deferred grading only, pending completion of sequence.) GE credit: WE. —W.

#### **104C. Honors Thesis (4)**

Tutorial—4 hours. Prerequisite: course 104A and 104B. Completion of a senior honors thesis under the direction of a faculty adviser. (Deferred grading only, pending completion of sequence.) GE credit: WE. —S.

#### **105. Teaching History (4)**

Lecture—3 hours; term paper. Teaching of American and world history at the K-12 level. Emphasis on introducing college students to the multiple ways in which history is taught, and on understanding how history education is determined. GE credit: ArtHum or SocSci | ACGH, AH or SS, WE.

#### **108. Global Environmental History (4)**

Lecture/discussion—3 hours; project. Global, comparative study of how environmental change, human perceptions of nature, and manipulations of nature have changed over time. Primary focus post-1500, emphasis on critically analyzing many common ideas of environmental change. Not open for credit to students who have taken History 109A. GE credit: ArtHum or SocSci | AH or SS.

#### **109A. Global Environmental History (4)**

Lecture/discussion—3 hours; project. Global, comparative study of how environmental change, human perceptions of nature, and manipulations of nature have changed over time. Primary focus post-1500, emphasis on critically analyzing many common ideas of environmental change. GE credit: ArtHum, or SocSci | AH or SS.

#### **109B. Environmental Change, Disease and Public Health (4)**

Lecture/discussion—3 hours; term paper. Analysis of environmental changes from pre-history to the present and their influence on disease distribution, virulence and public health; many of these changes have been driven by human action and transformations of pathogens have accelerated under globalization. GE credit: SciEng or SocSci, Div | SE or SS, SL.

#### **110. Themes in World History (4)**

Lecture—3 hours; term paper. Prerequisite: upper division standing. Issues and topics in world history. Topics will emphasize the interaction of diverse

regions of the world as well as common patterns of historical change. May be repeated for credit if topic and/or instructor differs. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### **110A. Colonialism and the Making of the Modern World (4)**

Lecture—3 hours; term paper. History of the modern world, focusing on struggles between Europeans and colonized peoples; the global formation of capitalism; the creation of nation-states; and the constitution of bourgeois bodies and racial selves in modern societies. Offered in alternate years. GE credit: ArtHum | AH or SS, VL, WC, WE.

#### **111A. Ancient History (4)**

Lecture—3 hours; discussion or paper (student option). History of ancient empires of the Near East and of their historical legacy to the Western world. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

#### **111B. Ancient History (4)**

Lecture—3 hours; discussion or paper (student option). Political, cultural and intellectual study of the Greek world from Minoan-Mycenaean period to end of Hellenistic Age. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

#### **111C. Ancient History (4)**

Lecture—3 hours; discussion or paper (student option). Development of Rome from earliest times. Rise and fall of the Roman Republic; the Empire to 476 A.D. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

#### **112A. Topics in Pre-Modern Jewish History (4)**

Lecture—3 hours; term paper. Topics in the history of Jews from the Biblical era to the eras of Jewish emancipation. Topics can be framed chronologically (e.g., medieval Jewry) or thematically (e.g., trade and Jewish communities). May be repeated one time for credit. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### **112B. Topics in Modern Jewish History (4)**

Lecture—3 hours; term paper. Topics in the history of Jews from the era of Jewish emancipation to the present. Topics can be framed chronologically or thematically (e.g. Zionism, assimilation, the post Holocaust Diaspora). May be repeated one time for credit. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### **112C. History of Jews in the Muslim World (4)**

Lecture—3 hours; term paper. History of Jewish communities in the lands of Islam from the time of the Prophet Muhammad to the present day. GE credit: SocSci | SS, WC, WE.

#### **113. History of Modern Israel (4)**

Lecture—3 hours; term paper. Topics include the rise and fall of utopian Zionism, the century-long struggle between Jews and Arabs, the development of modern Hebrew culture, the conflict between religious and secular Jews, and the nature of Israel's multicultural society. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### **115A. History of West Africa (4)**

Lecture—3 hours; term paper. Prerequisite: course 15 recommended. Introductory survey of the history of West Africa and/or the Congo region from the earliest times to the present. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### **115B. History of East and Central Africa (4)**

Lecture—3 hours; term paper. Prerequisite: course 15 recommended. Introductory survey of the history of east and central Africa from earliest times to the present. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### **115C. History of Southern Africa (4)**

Lecture—3 hours; term paper. Prerequisite: course 15 recommended. Introductory survey of the history of Southern Africa (including South Africa) from earliest times to the present. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### **115D. History and Legacy of Colonialism in Africa (4)**

Lecture—3 hours; term paper. Prerequisite: course 115A, 115B or 115C recommended. History of the implementation, development, and legacy of European Colonialism in Africa. A comparison of British, Belgian, French, and Portuguese colonial efforts and impacts. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### **115E. The African Slave Trade (4)**

Lecture—3 hours; writing—1 hour. History of the African Slave trades, from the early Egyptian and Saharan trades in the pre-modern period to the trans-Atlantic trade (15th-19th century) and the contemporary trafficking of humans. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### **115F. History of Modern North Africa, 1800 to the Present (4)**

Lecture—3 hours; term paper. History of Morocco, Algeria, Tunisia and Libya (the Maghrib), 1800 to the present. Topics include conquest and pacification, reform movements, the rise of nationalism, decolonization, state capitalism, economic liberalization, Islamism, democratization and human rights, the interplay of history and memory. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### **116. African History: Special Themes (4)**

Lecture—3 hours; term paper. Prerequisite: course 15 recommended. Themes of African history, such as African states and empires, slave trade, relationship of Egypt to rest of Africa, Bantu origins and migrations, and French policy of Assimilation and Association. Offered in alternate years. GE credit: ArtHum or SocSci | AH or SS, WC, WE.

#### **119. World War I (4)**

Lecture—3 hours; extensive writing. The First World War and the settlement that followed from 1914-1919. Causes, conduct, and consequences of the war including military, political, economic, social, and cultural factors, with special emphasis on connections between the home front and the battlefield. Offered in alternate years. GE credit: SS, WC, WE.

#### **120. World War II (4)**

Lecture—3 hours; extensive writing. The Second World War from 1931 to 1945 in all of its theaters. Causes, conduct, and consequences of the war including military, political, economic, social, and cultural factors, with special emphasis on battlefield strategy and mobilization of the home front. Offered irregularly. GE credit: SocSci | SS, WC, WE.

#### **121A. Medieval History (4)**

Lecture/discussion and panel presentations—3 hours. European history from "the fall of the Roman Empire" to the eighth century. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

#### **121B. Medieval History (4)**

Lecture/discussion and panel presentations—3 hours. European history from Charlemagne to the twelfth century. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

#### **121C. Medieval History (4)**

Lecture/discussion and panel presentations—3 hours. European history from the Crusades to the Renaissance. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

#### **122. Selected Themes in Medieval History (4)**

Lecture—3 hours; term paper. Each offering will focus on single major theme, such as medieval agrarian history, feudalism, the family, medieval Italy, or the Crusades. Readings include original sources in English translation and modern works. May be repeated for credit. Offered irregularly. GE credit: ArtHum or SocSci | AH or SS, WC, WE.

#### **125. Topics in Early Modern European History (4)**

Laboratory/discussion—3 hours; term paper. Social and cultural history, 1300-1800. Topics such as medieval and Renaissance Italy, early modern Italy, Ancient Regime France, family and sexuality, and

material culture and daily life. May be repeated for credit. Offered irregularly. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

### **130A. Christianity and Culture in Europe: 50-1450 (4)**

Lecture—3 hours; written report or research paper. A history of the ideas and institutions of Christianity and their impact on the late Roman Empire and medieval Europe in terms of outlook on life, art, politics and economics. Offered irregularly. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

### **130B. Christianity and Culture in Europe: 1450-1600 (4)**

Lecture—3 hours; written report or research paper. A history of the Lutheran, Zwinglian-Calvinist, Radical, Anglican, and Catholic Reformation as foundation stones of a new culture in Europe, with special attention to the interconnections between the revival of antiquity and the different reform movements. Offered irregularly. GE credit: ArtHum or SocSci | AH or SS, WC, WE.

### **130C. Christianity and Culture in Europe: 1600-1850 (4)**

Lecture—3 hours; written report or research paper. A survey of the intellectual, cultural and political reorientation of European society in the aftermath of the Wars of Religion. "Secularization" will be discussed in the context of the Enlightenment and Romanticism. Offered in alternate years. GE credit: ArtHum or SocSci | AH or SS, WC, WE.

### **131A. Early Modern European History (4)**

Lecture—3 hours; written reports. Western European history from about 1350 to about 1500. Offered irregularly. GE credit: ArtHum or SocSci | AH or SS, WC, WE.—Stuart

### **131B. European History During the Renaissance and Reformation (4)**

Lecture—3 hours; term paper. Survey of European society, politics, and culture from the late 15th through the early 17th centuries, with particular focus on the Italian and Northern Renaissance, on the Protestant Reformation, and the Catholic Counter Reformation. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.—Harris

### **131C. The Old Regime: Absolutism, Enlightenment and Revolution in Europe (4)**

Lecture—3 hours; term paper. Survey of European society, politics, and culture in the 17th and 18th centuries, focusing on religious warfare, absolutism, Scientific Revolution, Enlightenment and the growth of religious tolerance, the French Revolution and the collapse of the old regime. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

### **132. Crime and Punishment in Early Modern Europe (4)**

Lecture—3 hours; term paper. Deviance and crime in early modern Europe, contrasting imaginary crimes, e.g. witchcraft, with "real" crimes such as highway robbery and infanticide. Examines impact of gender, sexual orientation, ethnicity, and class in processes of criminalization. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

### **133. The Age of Ideas (4)**

Lecture—3 hours; written reports. The Enlightenment and its background in the seventeenth century. Offered in alternate years. GE credit: ArtHum or SocSci | AH or SS, WC, WE.

### **134A. The Age of Revolution (4)**

Lecture—3 hours; written reports. Ideas and institutions during the French Revolution and the Napoleonic era. Offered irregularly. GE credit: ArtHum or SocSci | AH or SS, WE.

### **135A. History of Science to the 18th Century (4)**

Lecture/discussion—3 hours; term paper. Survey of the historical development of science, technology, and medicine from the ancient world to the eighteenth century, with special emphasis on Isaac Newton as the culmination of the seventeenth century

scientific revolution. Offered irregularly. GE credit: ArtHum or SocSci | AH or SS, WC, WE.—Stolzenberg

### **135B. History of Science, 18th to 20th Centuries (4)**

Lecture/discussion—3 hours; term paper. Survey of the historical development of scientific thought in geology, biology, chemistry, physics, and cosmology from the eighteenth to the twentieth century, with special emphasis on emergence of broad explanatory principles that serve more than one science. Offered irregularly. GE credit: ArtHum or SocSci | AH or SS, WC, WE.

### **136. Scientific Revolution (4)**

Lecture/discussion—3 hours; term paper. History of science in Western Europe (1400-1750). Investigates the changing definitions of science in the age of Copernicus, Versalius, Harvey, Galileo and Newton. Considers the evolution of new ideas about nature, experiment, observation, and scientific theory. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

### **138A. The Rise of the Russian Empire, 1304-1825 (4)**

Lecture—3 hours; term paper. Expansion of the Russian state in Muscovite and imperial era. Emphasis on autocratic rule, the incorporation of non-Russian peoples, and emergence of Russia as a Great Power. Only two units of credit will be allowed to students who have completed former course 137B. Offered irregularly. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.—Campbell

### **138B. Reform and Revolution in Tsarist Russia, 1825-1917 (4)**

Lecture—3 hours; term paper. Processes of state reform and social change in the 19th century; failure of reform and collapse of the Russian Empire; the revolutions of 1917. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

### **138C. Russian History: The Rise and Fall of the Soviet Union, 1917 to the Present (4)**

Lecture—3 hours; term paper. The emergence of the Soviet Union as a socialist system and a Great Power; the decline and collapse of the Soviet Union and the formation of independent nation states in its place. Not open for credit to students who have completed former course 137C. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

### **139A. Medieval and Renaissance Medicine (4)**

Laboratory/discussion—3 hours; term paper. The history of medicine, circa 1000-1700. Revival of ancient medicine; role of the universities; development of anatomy, chemistry and natural history; ideas about the body; cultural understanding of disease; hospital and the public health system. Offered irregularly. GE credit: ArtHum or SocSci | AH or SS, WC, WE.

### **139B. Medicine, Society, and Culture in Modern Europe (4)**

Lecture—2 hours; discussion—1 hour; term paper. History of European medicine, 18th to 20th centuries, by examining the development of medical knowledge in epidemiology and anatomy; function of this knowledge, how it changed with technological breakthroughs and professionalization; and role of medicine in attitudes toward poverty, women, race, disease. Offered irregularly. GE credit: ArtHum or SocSci | AH or SS, WC, WE.

### **140. The Rise of Capitalism in Europe (4)**

Lecture—3 hours; term paper. Comparative analysis of major interpretations of the rise of merchant capitalism during the Middle Ages and Renaissance; European expansion overseas, 1450-1815; the transition to modern capitalism via industrial revolution. Interplay of social, political, cultural, and economic history. Offered irregularly. GE credit: ArtHum or SocSci | AH or SS, WC, WE.

### **141. France Since 1815 (4)**

Lecture—3 hours; term paper. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

### **142A. History of the Holocaust (4)**

Lecture—3 hours; term paper. Topics include comparative genocide, medieval and modern antisemitism, modern German history, the rise of Nazism, Jewish life in Europe before the Nazi period, and the fate of the Jewish communities and other persecuted groups in Europe from 1933-1945. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

### **142B. The Memory of the Holocaust (4)**

Lecture—3 hours; term paper. Examination of the literary, philosophical, theological and artistic responses to the Holocaust of the European Jews. Exploration of how memory is constructed, by whom and for what purposes. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

### **143. History of Eastern Europe and the Balkans (4)**

Lecture—3 hours; essays. History of the Baltic, Danubian, and Balkan lands since the Middle Ages. National cultures and conflicts in the Polish Commonwealth and the Habsburg and Ottoman Empires; nationalist movements, 1789-1914; the twentieth century, including an analysis of the contemporary scene. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

### **144A. History of Germany, 1450 to 1789 (4)**

Lecture—3 hours; extensive writing. Survey of early modern Germany, 1450 to 1789, covering the theology and social history of the Reformation, the Peasants War of 1525, religious warfare, state building and absolutism, the rise of Prussia, Austro-Prussian dualism, and the German Enlightenment. Offered in alternate years. GE credit: ArtHum or SocSci | AH or SS, WC, WE.

### **144B. History of Germany since 1789 (4)**

Lecture/discussion—3 hours; extensive writing. History of the German lands in the age of the French Revolution; 19th-century liberalism, nationalism, and industrialization; the World Wars, National Socialism, and the Holocaust; east and west Germany in the Cold War; the post-reunification scene. (Not open for credit to students who have completed former course 144.) Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

### **145. War and Revolution in Europe, 1789-1918 (4)**

Lecture—3 hours; term paper. Survey of revolutionary movements, international crises, and wars in Europe from the French Revolution to World War I. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

### **146A. Europe in the Twentieth Century (4)**

Lecture—3 hours; term paper. Survey of the history of Europe from 1919 to 1939. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

### **146B. Europe in the Twentieth Century (4)**

Lecture—3 hours; term paper. Survey of the history of Europe since 1939. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

### **147A. European Intellectual History, 1800-1870 (4)**

Lecture—3 hours; term paper. European thought in the early industrial era. Shifting cultural frameworks, from romanticism to scientism; liberal and socialist reactions to social change. Focus on the work of Goethe, Hegel, J.S. Mill, Marx, Darwin and Flaubert. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

### **147B. European Intellectual History, 1870-1920 (4)**

Lecture—3 hours; term paper. Cultural and intellectual watershed of the late nineteenth and early twentieth centuries. Emergence of modern art and literature; psychoanalysis and the new social sciences. Focus on the work of Baudelaire, Wagner, Nietzsche, Freud, Weber and Kafka. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

**147C. European Intellectual History, 1920-1970 (4)**

Lecture—3 hours; term paper. European thought and culture since World War I. Coverage includes: literature and politics; Communism and Western Marxism; Fascism; Existentialism; Structuralism; Feminism. Particular attention to Lenin, Brecht, Hitler, Sartre, Camus, Beckett, Marcuse, Foucault, Woolf and de Beauvoir. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

**148A. Women and Society in Europe: 1500-1789 (4)**

Lecture—3 hours; term paper. Roles and perceptions of women from the Renaissance to the French Revolution. Emphasis on social and economic factors as well as on discussions of women in the writings of political theorists and social commentators. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

**148B. Women and Society in Europe: 1789-1920 (4)**

Lecture—3 hours; term paper. Roles and perceptions of women from the French Revolution to World War I, primarily in France and England. Emphasis on social and economic developments within a loosely chronological and comparative framework. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

**148C. Women and Society in Europe: 1914-Present (4)**

Lecture—3 hours; term paper. The history of 20th-century Europe from the perspective of women and the family, and of sexual and gender relations. Emphasis on the impact on women of major events and movements, such as World War I, fascism, Soviet communism, World War II, the welfare state, feminism, and mass culture. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

**149. Comparative Cultural History of Modern Britain and France, 1880-1914 (4)**

Lecture—3 hours; term paper. Cultural comparison of the histories of Britain and France during the fin de siècle. Addresses cultural debates of the period (including gender, race, class) and the practices of cultural history. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

**151A. England: The Middle Ages (4)**

Lecture—3 hours; term paper. Origins of England to the accession of the Lancastrians. Survey includes: impact of Norman Conquest on Anglo-Saxon institutions; rise of the Church, common law, parliament, and the economy; thought, arts, and literature to the age of Chaucer and Wyclif. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

**151B. England: The Early Modern Centuries (4)**

Lecture—3 hours; term paper. From Lancaster and York to the Glorious Revolution. Includes growth of the Church of England; beginnings of modern worldwide economy; rise of the gentry and parliament; thought, arts, and literature in the times of More, Shakespeare, Hobbes, Wren, and Newton. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

**151C. Eighteenth-Century England (4)**

Lecture—3 hours; term paper. English history from the Glorious Revolution to the French Revolution. Examination of the transformation of one of Europe's most politically unstable kingdoms into the firmly established constitutional monarchy which provided an environment fit to engender the industrial revolution. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

**151D. Industrial England (4)**

Lecture—3 hours; term paper. English history from Waterloo to the Battle of Britain; the rise and continuance of the first industrial nation, examining the transformation of landed to class society, oligarchy to democracy and bureaucracy, Bentham to Blooms-

bury, empire to commonwealth. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

**159. Women and Gender in Latin American History (4)**

Lecture—3 hours; extensive writing. Roles of women and men in the history of Latin America, with an emphasis on the intersection of gender with racial and class categories. Introduction to the theoretical premises of women's and gender history. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

**160. Spain and America in the 16th Century (4)**

Lecture—3 hours; term paper. The Atlantic world in the 16th century, particularly the transcultural and reciprocal social and economic relations between Spain and America in the course of colonization. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

**161. Human Rights in Latin America (4)**

Lecture—3 hours; term paper. History of the origins, denial and protection of Human Rights in Latin America. Emphasis on dictatorships, political violence, social resistance, democracy, justice, accountability, truth commissions, memory. Offered in alternate years. (Same course as Human Rights 161.) GE credit: ArtHum or SocSci | AH or SS, VL, WC, WE.

**162. History of the Andean Region (4)**

Lecture/discussion—3 hours; written and/or oral reports. History of the Andean region, the area that now comprises modern Peru, Bolivia, and Chile, from the beginning of human settlement to the present. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

**163A. History of Brazil (4)**

Lecture—3 hours; written reports. The history of colonial and imperial Brazil from 1500 to 1889. Offered in alternate years. GE credit: ArtHum or SocSci | AH or SS, WC, WE.

**163B. History of Brazil (4)**

Lecture—3 hours; written reports. The history of the Brazilian republic from 1889 to the present. Offered in alternate years. GE credit: ArtHum or SocSci | AH or SS, WC, WE.

**164. History of Chile (4)**

Lecture—3 hours; term paper. Emphasis on the history of Chilean political economy from 1930 to the present. Various strategies of development (modernization, Marxism, Neo-Liberalism); the rise of mass politics; the course of foreign relations; and the richness of Chilean literature. Offered irregularly. GE credit: ArtHum or SocSci | AH or SS, WC, WE.

**165. Latin American Social Revolutions (4)**

Lecture—3 hours; written reports. Major social upheavals since 1900 in selected Latin American nations; similarities and differences in cause, course, and consequence. Offered in alternate years. GE credit: ArtHum or SocSci | AH or SS, WC, WE.

**166A. History of Mexico to 1848 (4)**

Lecture/discussion—3 hours; written and/or oral reports. Political, economic, and social development of pre-Columbian, colonial and national Mexico to 1848. Offered in alternate years. GE credit: ArtHum or SocSci | AH or SS, WC, WE.

**166B. History of Mexico Since 1848 (4)**

Lecture/discussion—3 hours; written and/or oral reports. History of Mexico from 1848 to the present. Offered in alternate years. GE credit: ArtHum or SocSci | AH or SS, WC, WE.

**167. Modern Latin American Cultural and Intellectual History (4)**

Lecture—3 hours; term paper. Introduction to the cultural and intellectual history of modern Latin America including architecture, cinema, painting, music, and literature. Offered irregularly. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

**168. History of Inter-American Relations (4)**

Lecture—3 hours; written reports. Diplomatic history of Latin America since independence, intra-Latin American relations, relations with the United States,

participation in international organizations, and communism in Latin America. Offered in alternate years. GE credit: ArtHum or SocSci | AH or SS, WC, WE.

**169A. Mexican-American History (4)**

Lecture/discussion—3 hours; written and/or oral reports. Economic, social, religious, cultural and political development of the Spanish-speaking population of the Southwestern United States from about 1800 to 1910. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

**169B. Mexican-American History (4)**

Lecture/discussion—3 hours; written and/or oral reports. Role of the Mexican and Mexican-American or Chicano in the economy, politics, religion, culture and society of the Southwestern United States since 1910. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.

**170A. Colonial America (4)**

Lecture—3 hours; term paper. Colonial society from 1607 to the American Revolution, with emphasis on European expansion, political, social and economic foundations, colonial thought and culture, and imperial rivalry. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, WE.

**170B. The American Revolution (4)**

Lecture—3 hours; term paper. Analysis of the Revolutionary epoch with emphasis on the structure of British colonial policy, the rise of revolutionary movements, the War for Independence and its consequences, and the Confederation period. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, WE.

**170C. The Early National Period, 1789-1815 (4)**

Lecture—3 hours. Political and social history of the American republic from the adoption of the Constitution through the War of 1812 and its consequences. Offered in alternate years. GE credit: ArtHum or SocSci | ACGH, AH or SS, DD, WE.

**171A. Jacksonian America (4)**

Lecture—3 hours; term paper. The political and social history of the United States from the end of the War of 1812 to the Compromise of 1850. How the market revolution transformed American life, and led the nation towards war. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.

**171B. Civil War and Reconstruction (4)**

Lecture—3 hours; term paper. Examination of the political and social history of the United States from the Compromise of 1850 to the end of Reconstruction in 1876. Causes of the war, the war itself, and the problems of reconstruction after the war. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.

**171BF. The Civil War in American Film (1)**

Discussion—1 hour; film viewing. Prerequisite: course 171B concurrently. Viewing and discussion of films with short writing assignments. [P/NP grading only.] Offered irregularly. GE credit: AH or SS.

**171D. Selected Themes in 19th Century American History (4)**

Lecture—3 hours; term paper. Interpretative overview of a single topic in the history of the United States in the 19th century. Sample topics include social history, the 1850s, and southern history. May be repeated one time for credit when topic differs. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt | ACGH, AH or SS, WE.

**172. American Environmental History (4)**

Lecture—3 hours; term paper. Prerequisite: course 17A. Examination of changing relations between people and nature in the area of the current United States from pre-Columbian times to the present. Topics include ecological change; perceptions of nature; social conflicts over "proper" uses of nature; environmental movement. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt | ACGH, AH or SS, WE.

### **173. Becoming an American: Immigration and American Culture (4)**

Lecture—3 hours; term paper. An introduction to the wide range of immigrant experiences and cycles of nativism that have shaped American culture in the twentieth century. From novels, memoirs and films, students will explore how external and internal immigration has created a multicultural society. Offered alternate years. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.

### **174A. The Gilded Age and Progressive Era: United States, 1876-1917 (4)**

Lecture—3 hours; term paper. Includes Southern redemption, Western incorporation, electoral corruption, labor movements, Populism, Progressivism, women's suffrage, U.S. imperial expansion, and immigration restriction. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt | ACGH, AH or SS, DD, WE.

### **174AD. Emergence of Modern America: Discussion (1)**

Discussion—1 hour; short papers. Prerequisite: course 174A concurrently. Intensive discussion of topics and readings for course 174A. (P/NP grading only.) Offered irregularly.

### **174B. War, Prosperity, and Depression: United States, 1917-1945 (4)**

Lecture—3 hours; term paper. America's emergence as a world power, the business culture of the 1920s, the New Deal and World War II. Emphasis on such issues as government regulation of the economy, welfare capitalism, and class, racial, ethnic, and gender conflicts. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt | ACGH, AH or SS, DD, WE.

### **174BD. America in War, Prosperity and Depression: Discussion (1)**

Discussion—1 hour; short papers. Prerequisite: course 174B concurrently. Intensive discussion of topics and readings for course 174B. (P/NP grading only.) Offered irregularly.

### **174C. The United States Since World War II, 1945 to the Present (4)**

Lecture—3 hours; term paper. America's struggle to respond to new complexities in foreign relations, social tensions, family changes and media. Emphasis on such topics as: Cold War; anticommunist crusade; civil rights; feminist and environmentalist movement; New Left; counterculture; Vietnam; Watergate; and the moral majority. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt | ACGH, AH or SS, DD, WE.

### **174CD. The United States Since World War II: Discussion (1)**

Discussion—1 hour. Prerequisite: course 174C concurrently. Intensive discussion of topics and readings for course 174C. (P/NP grading only.) Offered irregularly.

### **174D. Selected Themes in 20th Century American History (4)**

Lecture—3 hours; term paper. Interpretive overview of a single topic in the history of the United States in the 20th century with attention to the phases and processes of historical change. May be repeated one time for credit when topic differs. Offered in alternate years. GE credit: ArtHum or SocSci | ACGH, AH or SS, WE.

### **174DD. Selected Themes in 20th Century American History: Discussion (1)**

Discussion—1 hour. Prerequisite: course 174D concurrently. Intensive discussion of topics and readings for course 174D. May be repeated for credit. (P/NP grading only.) Offered irregularly.

### **175. American Intellectual History (4)**

Lecture—3 hours; term paper. Ideas that have shaped politics and society in the United States from colonial times to the present. Topics include American liberalism, republicanism, democracy, constitutionalism, communitarianism, utopianism, pragmatism, feminism, Darwinism, nationalism, con-

servatism, and economics. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt | ACGH, AH or SS, WE.

### **176A. Cultural and Social History of the United States (4)**

Lecture—3 hours; term paper. Study of social and cultural forces in American society in the nineteenth century with emphasis on social structure, work and leisure, socialization and the family, social reform movements and changes in cultural values. Offered in alternate years. GE credit: ArtHum or SocSci | ACGH, AH or SS, WE.

### **176B. Cultural and Social History of the United States (4)**

Lecture—3 hours; term paper. Study of social and cultural forces in American society in the twentieth century with emphasis on social structure, work and leisure, socialization and the family, social reform movements and changes in cultural values. Offered in alternate years. GE credit: ArtHum or SocSci | ACGH, AH or SS, DD, WE.

### **177A. History of Black People and American Race Relations, 1450-1860 (4)**

Lecture—3 hours; term paper. History of black people in the United States from the African background to Reconstruction. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.

### **177B. History of Black People and American Race Relations, 1860-Present (4)**

Lecture—3 hours; term paper. History of black people and race relations from 1860-present. Emphasis on Civil War, Reconstruction, Segregation, Age of Accommodation, black nationalism, urbanization, civil rights, and changing ideology of race relations. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.

### **178A. Race in America, 1492-1865 (4)**

Lecture—4 hours. Racial formation during the Age of Discovery, the Colonial Period, Early National and Antebellum periods up to the Civil War. Not open for credit to students who have completed course 178. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.

### **178B. Race in America, 1865-Present (4)**

Lecture—3 hours; term paper. Racial Formation in the Post Civil War. United States from 1860 to the present. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.

### **179. Asian American History, 1850-Present (4)**

Lecture—3 hours; term paper. The historical experience of people of Asian ancestry in the United States from the mid-nineteenth century to the present. Migration, labor, community formation, race relations, women and gender, popular culture. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.

### **180AN. American Political History, 1789-1896 (4)**

Lecture—3 hours; term paper. Growth of American politics from the birth of the republic to the end of the nineteenth century. Development of political parties, the expanding electorate, and how social issues such as slavery shaped the political process. Not open for credit to students who have completed course 180A. Offered irregularly. GE credit: ArtHum or SocSci, Wrt | ACGH, AH or SS, WE.

### **180BN. American Political History, 1896-present (4)**

Lecture—3 hours; term paper. Politics in the United States from 1896 to the present. Topics include race and partisan politics; communism and anti-communism; the New Deal and the centralization of government; and the rise of the imperial presidency. Not open for credit to students who have completed course 180A or 180C. Offered irregularly. GE credit: ArtHum or SocSci, Wrt | ACGH, AH or SS, WE.

### **181. Religion in American History to 1890 (4)**

Lecture—3 hours; term paper. American religious history from colonization through the Gilded Age. Topics include religious diversity in America; native American religion; Protestant evangelism; gender and religion; religion and bigotry; African American religion; religion in the Civil War; and religion's response to modernization. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt | ACGH, AH or SS, WE.—Smolenski

### **182. Gender and Justice in American History (4)**

Lecture/discussion—3 hours; term paper. Intersection of gender and law in North America from the colonial period through the 20th century. Topics include witchcraft, suffrage, child custody, protective labor laws, regulation of sexuality. Analysis of legal change, trials, and cultural influences. Offered irregularly. GE credit: ArtHum or SocSci | ACGH, AH or SS, DD, WE.

### **183A. The Frontier Experience: Trans-Mississippi West (4)**

Lecture—3 hours; written and/or oral reports. The fur trade, western exploration and transportation, the Oregon Country, the Greater Southwest and the Mexican War, the Mormons, mining discovery, and the West during the Civil War. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, WE.

### **183B. The Frontier Experience: Trans-Mississippi West (4)**

Lecture—3 hours; written and/or oral reports. Spread of the mining kingdom, the range cattle industry, Indian-military affairs, settlement of the Great Plains and Rocky Mountain Regions and political organization of the West. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, WE.

### **184. History of Sexuality in America (4)**

Lecture—3 hours; extensive writing. History of sexuality in America from pre-European through the late twentieth century. Topics include birth control, marriage, sexual violence, prostitution, inter-racial relationships, heterosexuality and homosexuality, the feminist, gay, and lesbian liberation movements, AIDS, commercialization of sexuality. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | ACGH, AH or SS, DD, WE.

### **185A. History of Science in America (4)**

Lecture—3 hours; research paper. Survey of the European background. Study of American scientific institutions, ideas, personalities, creative processes in science, and of relationships between society and science from colonial times to present. Offered irregularly. GE credit: ArtHum or SocSci, Wrt | AH or SS, WE.

### **185B. History of Technology in America (4)**

Lecture—3 hours; research paper. Study of American technology, emphasizing biographical approach to historical understanding of technological change, creative processes, institutions, ideas, and relationships between technology and society from colonial times to present. Offered irregularly. GE credit: ArtHum or SocSci, Wrt | AH or SS, WE.

### **188. America in the 1960s (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Tumult and upheaval in American politics, culture, and society 1961-1969. Civil rights; Vietnam, the draft and the anti-war movement; rock and roll and the counterculture; modern feminism; modern conservatism; student movements; urban unrest and its repression. Offered in alternate years. GE credit: SocSci | ACGH, DD, SS, WE.

### **189. California History (4)**

Lecture—3 hours; term paper. California history from the pre-colonial period to the present including dis-possession of California's Indians, political economy of the Spanish and Mexican periods, Gold Rush effects, industrialization, Hollywood, water politics, World War II, Proposition 13, and the emergence of the Silicon Valley. Not open for credit to students

who have completed two courses of course 189A, 189B, 189C. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt | ACGH, AH or SS, DD, WE.

#### **190A. Middle Eastern History I: The Rise of Islam, 600-1000 (4)**

Lecture—3 hours; extensive writing. Middle Eastern history from the rise of Islam to the disintegration of the Abbasid Caliphate; the formative centuries of a civilization. Politics and religion, conquest and conversion, arts and sciences, Christians, Jews and Muslims, gender and sexuality, orthodoxy and heterodoxy. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### **190B. Middle Eastern History II: The Age of the Crusades, 1001-1400 (4)**

Lecture—3 hours; extensive writing. Middle Eastern history during the age of the Crusades and Mongol invasions. The idea of holy war, the Crusades, the Mongols as the bearers of Chinese arts, nomads and sedentary life, feudalism, mysticism, slavery, women in the medieval Middle East. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### **190C. Middle Eastern History III: The Ottomans, 1401-1730 (4)**

Lecture—3 hours; extensive writing. Middle Eastern history from the foundation of the Ottoman Empire on the borderlands of Byzantine Anatolia through its expansion into Europe, Asia, and Africa, creating a new cultural synthesis including the Arab, Greek, Islamic, Mongol, Persian, Slavic, and Turkish traditions. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### **190D. Middle Eastern History IV: Safavids Iran, 1300-1720 (4)**

Lecture—3 hours; term paper. Middle Eastern history focusing on Safavid Empire [present-day Iran, Iraq, Afghanistan, up to Georgia], beginning with the origins of the dynasty as a powerful religious family, to the establishment of the Empire, focusing on Social, Religious, Economic, and Political History. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### **191A. Classical China (4)**

Lecture—3 hours; term paper. History of Chinese civilization from its origins through the establishment of city states and the flowering of classical philosophy, to the rise and fall of the First Empire. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### **191B. High Imperial China (4)**

Lecture—3 hours; term paper. Political disunion and the influx of Buddhism; reunification under the great dynasties of T'ang, Sung, and Ming with analysis of society, culture and thought. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### **191C. Late Imperial China (4)**

Lecture—2 hours; discussion—1 hour; two long papers. Prerequisite: course 9A or upper division standing recommended. Patterns and problems of Chinese life traced through the Ming and Ch'ing dynasties (c. 1500–1800), prior to the confrontation with the West in the Opium War. Readings include primary sources and novels portraying elite ethos as well as popular culture. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### **191D. Nineteenth Century China: The Empire Confronts the West (4)**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 9A or upper division standing recommended. The decline and fall of the Chinese Empire, with particular attention to the social and political crises of the 19th century, and the response of government officials, intellectuals, and ordinary people to the increasing pressures of Western imperialism. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### **191E. The Chinese Revolution (4)**

Lecture—2 hours; discussion—1 hour; extensive writing. Prerequisite: upper division standing recommended. Analysis of China's cultural and political transformation from Confucian empire into Communist state. Emphasis on emergence and triumph of peasant revolutionary strategy (to 1949), with some attention to its implications for post-revolutionary culture and politics. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### **191F. History of the People's Republic of China (4)**

Lecture—2 hours; discussion—1 hour; extensive writing. Prerequisite: upper division standing recommended. Comprehensive analysis of recent Chinese history, including land reform, the Cultural Revolution, the post-Mao era, and the consequences of the new economic policies of the 1980s. Not open for credit to students who have completed course 190C. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### **191G. Special Topics in Chinese History to 1800 (4)**

Lecture—3 hours; extensive writing. Prerequisite: course 9A recommended. Topics in the history of China from the beginning of the imperial period through the high Qing dynasty. Topics may be framed chronologically (e.g., the Ming Dynasty) or thematically (e.g., Trade in early Chinese history). May be repeated one time for credit when topic differs. Offered irregularly. GE credit: AH, WC, WE.

#### **191H. Special Topics in Chinese History after 1800 (4)**

Lecture—3 hours; extensive writing. Prerequisite: course 9A recommended. Topics in the history of China since 1800. Topics may be framed chronologically (e.g., The Republican Period (1911-1948)) or thematically (e.g., The Modern Evolution of Chinese Law). May be repeated one time for credit when topic differs. Offered irregularly. GE credit: AH, WC, WE.

#### **191J. Sex and Society in Modern Chinese History (4)**

Lecture—3 hours; term paper. Role of sex, gender, and family relations in the development of Chinese politics, society, and personal life in the modern period, 1900-present. Not open for credit to students who have completed course 190C. Offered irregularly. GE credit: ArtHum | AH, WC, WE.

#### **192. Internship in History (1-12)**

Prerequisite: enrollment dependent on availability of intern positions, with priority to History majors. Supervised internship and study as historian, archivist, curator, or in another history-related capacity, in an approved organization or institution. (P/NP grading only.) Offered irregularly.

#### **193A. History of the Modern Middle East, 1750-1914 (4)**

Lecture—3 hours; term paper. Prerequisite: course 6 recommended. Transformation of state and society within the Middle East from 1750 to 1914 under pressure of the changing world economy and European imperialism. Themes include colonialism, Orientalism, Arab intellectual renaissance, Islamic reform, state-formation, role of subaltern groups. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, VL, WC, WE.

#### **193B. History of the Modern Middle East from 1914 (4)**

Lecture—3 hours; term paper. The Middle East from the turn of the 20th century to the present. Themes include the legacy of imperialism, cultural renaissance, the World Wars, nationalism, Palestine-Israel, Islamic revival, gender, revolutionary movements, politics of oil and war, cultural modernism, exile and diaspora. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, VL, WC, WE.

#### **193C. The Middle East Environment: Historical Change and Current Challenges (4)**

Lecture/discussion—3 hours; project. Examines Middle East environment and human use of nature over last 10,000 years. Introduction to desert ecology, environmental history and current environmental problems. Case Studies of Egypt, Maghreb countries, Arabian peninsula/Gulf countries, desertification, water, indigenous knowledge, and national parks. GE credit: ArtHum or SocSci | AH or SS, WE.

#### **193D. History of Modern Iran, From 1850 to Present (4)**

Lecture—3 hours; term paper. Prerequisite: course 6 recommended. Modern Iran from the mid 19th century to the present. Themes include the legacy of imperialism, cultural renaissance, the World Wars, nationalism, modernization, Islamic revival, gender, revolutionary movements, politics of oil and war. Offered in alternate years. GE credit: SocSci, Div, Wrt | AH or SS, VL, WC, WE.

#### **194A. Aristocratic and Feudal Japan (4)**

Lecture—3 hours; term paper and/or discussion. Broad survey of the cultural, social, religious, and political aspects of Japanese history from mythological times through the sixteenth century emphasizing comparison of the organizations, values, and beliefs associated with the aristocratic and feudal periods. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### **194B. Early Modern Japan (4)**

Lecture—3 hours; term paper and/or discussion. Survey of the cultural, social, economic, and political aspects of Japanese history from the seventeenth through the nineteenth centuries emphasizing the development of those patterns of thought and political organization with which Japan met the challenge of the nineteenth-century Western expansionism. Offered in alternate years. GE credit: ArtHum or SocSci, Div | AH or SS, WC, WE.

#### **194C. Modern Japan (4)**

Lecture—3 hours; term paper and/or discussion. Survey of the cultural, social, economic, and political aspects of Japanese history in the twentieth century emphasizing labor and social movements, militarism and the Pacific war, and the emergence of Japan as a major economic power. Offered in alternate years. GE credit: ArtHum or SocSci, Div | AH or SS, WC, WE.

#### **194D. Business and Labor in Modern Japan (4)**

Lecture—3 hours; term paper. Survey of labor and management relations in Japan from the mid-eighteenth century to the present. Offered in alternate years. GE credit: ArtHum or SocSci | AH or SS, WC, WE.

#### **194E. Education and Technology in Modern Japan (4)**

Lecture—3 hours; term papers. Survey of education and technology in Japan from the mid-eighteenth century to the present. Offered in alternate years. GE credit: ArtHum or SocSci | AH or SS, WC, WE.

#### **195B. History of Modern Korea (4)**

Lecture—3 hours; laboratory/discussion—1 hour. Prerequisite: upper division standing recommended. History of Modern Korea, from Yi dynasty period to 1990s. Covers the political and socioeconomic changes in 19th century, modernization under Japanese colonialism, postwar economic growth and effects of the Cold War. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

#### **196A. Medieval India (4)**

Lecture—3 hours; discussion—1 hour; written reports. Survey of history of India in the millennium preceding arrival of British in the eighteenth century, focusing on interaction of the civilizations of Hinduism and Islam and on the changing nature of the state. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

**196B. Modern India (4)**

Lecture—3 hours; discussion—1 hour; written reports. Survey of cultural, social, economic, and political aspects of South Asian history from arrival of the British in the eighteenth century to formation of new independent states—India, Bangladesh, and Pakistan—in the twentieth century. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.

**197T. Tutoring in History (2)**

Discussion—1 hour; laboratory—3 hours. Prerequisite: enrolled as a History major with senior standing and consent of department chairperson. Tutoring of students in lower division courses. Weekly meeting with instructors in charge of courses. Written reports on methods and materials required. May be repeated one time for credit. No final examination. (P/NP grading only.) Offered irregularly.

**198. Directed Group Study (1-5)**

Prerequisite: consent of instructor; upper division standing. (P/NP grading only.) Offered irregularly.

**199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) Offered irregularly.

**Graduate****201A. Sources and General Literature of History; Ancient (4)**

Seminar—3 hours; term paper. Prerequisite: consent on instructor. Designed primarily for students preparing for higher degrees in history. Ancient. May be repeated for credit when different subject area is studied.

**201B. Sources and General Literature of History; Medieval (4)**

Seminar—3 hours; term paper. Prerequisite: consent on instructor. Designed primarily for students preparing for higher degrees in history. Medieval. May be repeated for credit when different subject area is studied.

**201C. Sources and General Literature of History; Renaissance and Reformation (4)**

Seminar—3 hours; term paper. Prerequisite: consent on instructor. Designed primarily for students preparing for higher degrees in history. Renaissance and Reformation. May be repeated for credit when different subject area is studied. Offered in alternate years.

**201D. Sources and General Literature of History; Early Modern Europe (4)**

Seminar—3 hours; term paper. Prerequisite: consent on instructor. Designed primarily for students preparing for higher degrees in history. Early Modern Europe. May be repeated for credit when different subject area is studied. Offered in alternate years.

**201E. Sources and General Literature of History; Europe Since 1815 (4)**

Seminar—3 hours; term paper. Prerequisite: consent on instructor. Designed primarily for students preparing for higher degrees in history. Europe since 1815. May be repeated for credit when different subject area is studied. Offered in alternate years.

**201F. Sources and General Literature of History; China to 1880 (4)**

Seminar—3 hours; term paper. Prerequisite: consent on instructor. Designed primarily for students preparing for higher degrees in history. China to 1880. May be repeated for credit when different subject area is studied. Offered irregularly.

**201G. Sources and General Literature of History; China Since 1880 (4)**

Seminar—3 hours; term paper. Prerequisite: consent on instructor. Designed primarily for students preparing for higher degrees in history. China since 1880. May be repeated for credit when different subject area is studied. Offered in alternate years.

**201H. Sources and General Literature of History; Britain (4)**

Seminar—3 hours; term paper. Prerequisite: consent on instructor. Designed primarily for students preparing for higher degrees in history. Britain. May be repeated for credit when different subject area is studied. Offered in alternate years.

**201I. Sources and General Literature of History; Latin America Since 1810 (4)**

Seminar—3 hours; term paper. Prerequisite: consent on instructor. Designed primarily for students preparing for higher degrees in history. Latin America since 1810. May be repeated for credit when different subject area is studied. Offered in alternate years.

**201J. Sources and General Literature of History; American History to 1787 (4)**

Seminar—3 hours; term paper. Prerequisite: consent on instructor. Designed primarily for students preparing for higher degrees in history. American History to 1787. May be repeated for credit when different subject area is studied. Offered in alternate years.

**201K. Sources and General Literature of History; United States, 1787-1896 (4)**

Seminar—3 hours; term paper. Prerequisite: consent on instructor. Designed primarily for students preparing for higher degrees in history. United States, 1787-1896. May be repeated for credit when different subject area is studied. Offered in alternate years.

**201L. Sources and General Literature of History; United States Since 1896 (4)**

Seminar—3 hours; term paper. Prerequisite: consent on instructor. Designed primarily for students preparing for higher degrees in history. United States since 1896. May be repeated for credit when different subject area is studied. Offered in alternate years.

**201M. Sources and General Literature of History; Middle East (4)**

Seminar—3 hours; term paper. Prerequisite: consent on instructor. Addresses various theoretical and methodological approaches to the study of the Modern Middle East. Survey Modern Middle East historiography in light of theoretical innovations such as post-Orientalism, World Systems theory, and postcolonial theory. May be repeated for credit when subject differs. Offered in alternate years.

**201N. Sources and General Literature of History; Modern Japan (4)**

Seminar—3 hours; term paper. Prerequisite: consent on instructor. Designed primarily for students preparing for higher degrees in history. Modern Japan. May be repeated for credit when different subject area is studied. Offered in alternate years.

**201P. Sources and General Literature of History; African Historiography (4)**

Seminar—3 hours; term paper. Prerequisite: consent on instructor. Designed primarily for students preparing for higher degrees in history. African Historiography. May be repeated for credit when different subject area is studied. Offered in alternate years.

**201Q. Sources and General Literature of History; Cross-Cultural Women's History (4)**

Seminar—3 hours; term paper. Prerequisite: consent on instructor. Designed primarily for students preparing for higher degrees in history. Cross-Cultural Women's History. May be repeated for credit when different subject area is studied. Offered in alternate years.

**201S. Sources and General Literature of History; History of Science and Medicine (4)**

Seminar—3 hours; term paper. Prerequisite: consent on instructor. Designed primarily for students preparing for higher degrees in history. History of Science and Medicine. May be repeated for credit when different subject area is studied. Offered in alternate years.

**201T. Sources and General Literature of History; Jewish History (4)**

Seminar—3 hours; term paper. Prerequisite: consent on instructor. Designed primarily for students preparing for higher degrees in history. Jewish History. May be repeated for credit when different subject area is studied. Offered in alternate years.

**201W. Sources and General Literature of History; Advanced Topics in World History (4)**

Seminar—3 hours; term paper. Prerequisite: consent on instructor. Designed primarily for students preparing for higher degrees in history. Advanced Topics in World History. May be repeated for credit when different subject area is studied. Offered in alternate years.

**201X. Undergraduate Proseminar in History; Comparative History (5)**

Seminar—3 hours; term paper. Limited enrollment. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. Comparative History, selected topics in cultural, political, economic, and social history that deal comparatively with more than one geographic field. May be repeated for credit when different subject area is studied. Offered in alternate years. GE credit: WE.

**202A. Major Issues in Historical Interpretation; Ancient (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Fundamental issues and debates in the study of history. Ancient. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Offered in alternate years.

**202B. Major Issues in Historical Interpretation; Medieval Europe (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Fundamental issues and debates in the study of history. Medieval Europe. Readings, papers, and class reports. Offered in alternate years.

**202C. Major Issues in Historical Interpretation; Modern Europe (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Fundamental issues and debates in the study of history. Modern Europe. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Offered in alternate years.

**202D. Major Issues in Historical Interpretation (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Fundamental issues and debates in the study of history. India. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Offered in alternate years.

**202E. Major Issues in Historical Interpretation; India (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Fundamental issues and debates in the study of history. Africa. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Offered in alternate years.

**202F. Major Issues in Historical Interpretation; China (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Fundamental issues and debates in the study of history. China. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Offered in alternate years.

**202G. Major Issues in Historical Interpretation; Japan (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Fundamental issues and debates in the study of history. Japan. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Offered in alternate years.

**202H. Major Issues in Historical Interpretation; United States (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Fundamental issues and debates in the study of history. United States. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Offered in alternate years.

**202I. Major Issues in Historical Interpretation; Latin America (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Fundamental issues and debates in the study of history. Latin America. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied. Offered in alternate years.

**203A. Research Seminar (4)**

Seminar—3 hours; tutorial—1 hour. Designed for students preparing for higher degrees in history. Individual research and analysis resulting in substantial research paper of publishable quality. Completion required of all Ph.D. candidates. The three courses must be taken in continuous sequence, ordinarily during second year.—F. (F.)

**203B. Research Seminar (4)**

Seminar—3 hours; tutorial—1 hour. Prerequisite: course 203A. Designed for students preparing for higher degrees in history. Individual research and analysis resulting in substantial research paper of publishable quality. Completion required of all Ph.D. candidates. The three courses must be taken in continuous sequence, ordinarily during second year. (Deferred grading only, pending completion of sequence.)—W. (W.)

**203C. Research Seminar (4)**

Seminar—3 hours; tutorial—1 hour. Prerequisite: course 203A. Designed for students preparing for higher degrees in history. Individual research and analysis resulting in substantial research paper of publishable quality. Completion required of all Ph.D. candidates. The three courses must be taken in continuous sequence, ordinarily during second year. (Deferred grading only, pending completion of sequence.)—S. (S.)

**204. Historiography (4)**

Seminar—3 hours; term paper. Major issues in the philosophy and methodology of history.—F. (F.)

**221. Medieval History (4)**

Seminar—3 hours. Prerequisite: courses 121A, 121B, 121C recommended. Topics in the history of medieval and early Renaissance Europe. Offered irregularly.

**245. Modern European History (4)**

Seminar—3 hours. Prerequisite: course 201E. Primary sources and research methodologies in the history of modern France and Germany. May be repeated one time for credit. Offered irregularly.

**261. Latin American History (4)**

Seminar—3 hours. Prerequisite: two courses in Latin American history; reading knowledge of Spanish or Portuguese. Offered irregularly.

**271A. United States History (4)**

Seminar—3 hours; term paper. Prerequisite: course 201J-L or 202H. Research in literature, methods, and sources on aspects of United States history, culminating in each student completing a research paper in the field by the end of the second quarter. May be repeated for credit. (Deferred grading only, pending completion of sequence.) Offered irregularly.

**271B. United States History (4)**

Seminar—3 hours; term paper. Prerequisite: course 201J-L or 202H. Research in literature, methods, and sources on aspects of United States history, culminating in each student completing a research paper in the field by the end of the second quarter. May be repeated for credit. (Deferred grading only, pending completion of sequence.) Offered irregularly.

**291A. Chinese History (4)**

Seminar—3 hours; term paper. Prerequisite: consent of instructor. Research on topics to be chosen by the students for the purpose of writing article-length papers. May be repeated for credit. (Deferred grading only, pending completion of sequence.) Offered irregularly.

**291B. Chinese History (4)**

Seminar—3 hours; term paper. Prerequisite: consent of instructor. Completion of article-length papers on topics chosen by students. May be repeated for credit. (Deferred grading only, pending completion of sequence.) Offered irregularly.

**291C. Methods and Issues in Chinese History (4)**

Seminar—2 hours; tutorial—1 hour. Prerequisite: reading knowledge of Chinese; consent of instructor. Readings in Chinese historical materials. Training in the use of Chinese reference works (including on-line resources). May be repeated for credit. Offered irregularly.

**292. College Teaching Internship (4)**

Internship—4 hours. Prerequisite: course 300 (may be taken concurrently). Student prepares and teaches one lower division history course in a nearby community college under the supervision of a UC Davis instructor and a community college instructor. (S/U grading only.) Offered irregularly.

**298. Group Study (1-5)**

(S/U grading only.)

**299D. Individual Study (1-12)**

(S/U grading only.)

**Professional****389. Introductory Seminar for Teaching Assistants (1)**

Seminar—1 hour. Prerequisite: must be enrolled in course 390. An introduction to the broad comparative and theoretical issues of teaching methods and techniques in history. (S/U grading only.)

**390. Teaching History in College (2)**

Discussion—2 hours. Designed for teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the university. (S/U grading only.)

## History and Philosophy of Science

(College of Letters and Science)

Joseph Dumit, Ph.D., Program Director

**Program Office.** 101 Young Hall

**Committee in Charge**

Thomas Beamish, Ph.D. (*Sociology*)

Mario Biagioli, Ph.D. (*Science and Technology Studies, School of Law*)

Patrick Carroll, Ph.D. (*Sociology*)

Timothy Choy, Ph.D. (*Anthropology, Science and Technology Studies*)

Marisol de la Cadena, Ph.D. (*Anthropology*)

Joseph Dumit, Ph.D. (*Anthropology, Science and Technology Studies*)

James Griesemer, Ph.D. (*Philosophy*)

Caren Kaplan, Ph.D. (*American Studies*)

Colin Milburn, Ph.D. (*English*)

Roberta Millstein, Ph.D. (*Philosophy*)

Daniel Stolzenberg, Ph.D. (*History*)

Madhavi Sunder, J.D. (*School of Law*)

**Minor Program Requirements:**

The interdisciplinary minor in the history and philosophy of science invites students to examine historical and contemporary problems in a variety of scientific disciplines, and to explore concepts and procedures basic to science and how they have evolved. The minor is sponsored by the Program in Science and Technology Studies.

UNITS

**History and Philosophy of Science.....24**

Philosophy 30.....4

Five courses from those listed below. One course must be from each of three areas: (a) history, (b) philosophy, and (c) science and technology studies.....20

(a) History 102, 135A, 135B, 136, 139A, 139B, 185A, 185B, 188A, 188B;

(b) Philosophy 107, 108, 109, 110, 111, 112;

(c) Science and Technology Studies 20,

130A, 130B, 131, 150, 180.

**Minor Adviser.** 101 Young Hall,

[stsadvising@ucdavis.edu](mailto:stsadvising@ucdavis.edu).

## Horticulture and Agronomy (A Graduate Group)

\_\_\_\_\_, Chairperson of the Group

**Group Office.** 1224 Plant and Environmental Sciences Building

530-752-7738; <http://ggha.ucdavis.edu>

**Faculty**

Douglas O. Adams, Ph.D., Professor  
(*Viticulture and Enology*)

Kassim Al-Khatib, Ph.D., Professor (*Plant Sciences*)

Diane M. Beckles, Ph.D., Associate Professor  
(*Plant Sciences*)

Alan B. Bennett, Ph.D., Professor (*Plant Sciences*)

Alison M. Berry, Ph.D., Professor (*Plant Sciences*)

Arnold J. Bloom, Ph.D., Professor (*Plant Sciences*)

Eduardo Blumwald, Ph.D., Professor (*Plant Sciences*)

Kent J. Bradford, Ph.D., Professor (*Plant Sciences*)

Patrick H. Brown, Ph.D., Professor (*Plant Sciences*)

E. Charles Brummer, Ph.D., Professor  
(*Plant Sciences*)

Dario Cantu, Ph.D., Assistant Professor  
(*Viticulture and Enology*)

Abhaya M. Dandekar, Ph.D., Professor  
(*Plant Sciences*)

Jorge Dubcovsky, Ph.D., Professor (*Plant Sciences*)

Jan Dvorak, Ph.D., Professor (*Plant Sciences*)

Valerie T. Eviner, Ph.D., Associate Professor  
(*Plant Sciences*)

Albert J. Fischer, Ph.D., Professor (*Plant Sciences*)

Amélie Gaudin, Ph.D., Assistant Professor  
(*Plant Sciences*)

Paul L. Gepts, Ph.D., Distinguished Professor  
(*Plant Sciences*)

Matthew E. Gilbert, Ph.D., Assistant Professor  
(*Plant Sciences*)

Thomas M. Gradiel, Ph.D., Professor  
(*Plant Sciences*)

Robert Hijmans, Ph.D., Associate Professor  
(*Environmental Science and Policy*)

William Horwath, Ph.D., Professor  
(*Land, Air and Water Resources*)

Kentaro Inoue, Ph.D., Professor (*Plant Sciences*)

Louise E. Jackson, Ph.D., Professor  
(*Land, Air and Water Resources*)

Marie A. Jasieniuk, Ph.D., Associate Professor  
(*Plant Sciences*)

Judy Jernstedt, Ph.D., Professor (*Plant Sciences*)

Steven J. Knapp, Ph.D., Professor (*Plant Sciences*)

Emilio A. Laca, Ph.D., Professor (*Plant Sciences*)

J. Heinrich Lieth, Ph.D., Professor (*Plant Sciences*)

Mark A. Mathews, Ph.D., Professor  
(*Viticulture and Enology*)

Maeli Melotto, Ph.D., Assistant Professor  
(*Plant Sciences*)

Richard W. Michelmore, Ph.D., Distinguished Professor  
(*Plant Sciences*)

David B. Neale, Ph.D., Professor (*Plant Sciences*)

Sharman O'Neill, Ph.D., Professor (*Plant Biology*)

Daniel Potter, Ph.D., Professor (*Plant Sciences*)

Jeffrey S. Ross-Ibarra, Ph.D., Associate Professor  
(*Plant Sciences*)

Daniel E. Runcie, Ph.D., Assistant Professor  
(*Plant Sciences*)

Kate M. Scow, Ph.D., Professor  
*(Land, Air and Water Resources)*  
 Kenneth A. Shackel, Ph.D., Professor (*Plant Sciences*)  
 David R. Smart, Ph.D., Professor  
*(Viticulture and Enology)*  
 Dina St. Clair, Ph.D., Professor (*Plant Sciences*)  
 Kenneth W. Tate, Ph.D., Professor (*Plant Sciences*)  
 Li Tian, Ph.D., Associate Professor (*Plant Sciences*)  
 Chris van Kessel, Ph.D., Professor (*Plant Sciences*)  
 Astrid Volder, Ph.D., Assistant Professor  
*(Plant Sciences)*  
 M. Andrew Walker, Ph.D., Professor  
*(Viticulture and Enology)*  
 Larry E. Williams, Ph.D., Professor  
*(Viticulture and Enology)*  
 John I. Yoder, Ph.D., Professor (*Plant Sciences*)  
 Florence Zakharov, Ph.D., Associate Professor  
*(Plant Sciences)*  
 Maciej Zwieniecki, Ph.D., Associate Professor  
*(Plant Sciences)*

### Affiliated Faculty

Kendra Baumgartner, Ph.D., Lecturer and Research Plant Pathologist (*Plant Pathology*)  
 Marita Cantwell, Ph.D., Lecturer and Specialist in Cooperative Extension (*Plant Sciences*)  
 Roger T. Chetelat, Ph.D., Lecturer and Agronomist (*Plant Sciences*)  
 Carlos H. Crisosto, Ph.D., Lecturer and Specialist in Cooperative Extension (*Plant Sciences*)  
 Joseph M. DiTomaso, Ph.D., Lecturer and Specialist in Cooperative Extension (*Plant Sciences*)  
 Richard Y. Evans, Ph.D., Lecturer and Specialist in Cooperative Extension (*Plant Sciences*)  
 Steven A. Fennimore, Ph.D., Lecturer and Specialist in Cooperative Extension (*Plant Sciences*)  
 Louise Ferguson, Ph.D., Lecturer and Specialist in Cooperative Extension (*Plant Sciences*)  
 Matthew W. Fidelibus, Ph.D., Associate Specialist in Cooperative Extension (*Viticulture & Enology*)  
 Elise Gornish, Ph.D., Lecturer and Assistant Specialist in Cooperative Extension (*Plant Sciences*)  
 W. Douglas Gubler, Ph.D., Lecturer and Extension Plant Pathologist (*Plant Pathology*)  
 Bradley D. Hanson, Ph.D., Lecturer and Specialist in Cooperative Extension (*Plant Sciences*)  
 Timothy K. Hartz, Ph.D., Lecturer and Specialist in Cooperative Extension (*Plant Sciences*)  
 Stephen R. Kaffka, Ph.D., Lecturer and Specialist in Cooperative Extension (*Plant Sciences*)  
 S. Kaan Kurtural, Ph.D., Lecturer and Associate Specialist in Cooperative Extension (*Viticulture and Enology*)  
 Bruce D. Lampinen, Ph.D., Lecturer and Specialist in Cooperative Extension (*Plant Sciences*)  
 Bruce Linquist, Ph.D., Lecturer and Associate Specialist in Cooperative Extension (*Plant Sciences*)  
 Mark E. Lundy, Ph.D., Lecturer and Assistant Specialist in Cooperative Extension (*Plant Sciences*)  
 David J. Mackill, Ph.D., Adjunct Professor (*Plant Sciences*)  
 Andrew J. McElrone, Ph.D., Assistant Adjunct Professor (*Viticulture and Enology*)  
 Elizabeth J. Mitcham, Ph.D., Lecturer and Specialist in Cooperative Extension (*Plant Sciences*)  
 Jeffrey P. Mitchell, Ph.D., Lecturer and Specialist in Cooperative Extension (*Plant Sciences*)  
 Anita Oberholster, Ph.D., Lecturer and Assistant Specialist in Cooperative Extension (*Viticulture and Enology*)  
 Lorence R. Oki, Ph.D., Lecturer and Associate Specialist in Cooperative Extension (*Plant Sciences*)  
 Dan E. Parfitt, Ph.D., Lecturer and Pomologist (*Plant Sciences*)  
 Ann Powell, Ph.D., Lecturer and Researcher (*Plant Sciences*)  
 Daniel H. Putnam, Ph.D., Lecturer and Specialist in Cooperative Extension (*Plant Sciences*)  
 Leslie M. Roche, Lecturer and Assistant Specialist in Cooperative Extension (*Plant Sciences*)  
 Johan W. Six, Ph.D., Adjunct Professor (*Plant Sciences*)

Kerri L. Steenwerth, Ph.D., Assistant Adjunct Professor (*Viticulture and Enology*)  
 Trevor V. Suslow, Ph.D., Lecturer and Specialist in Cooperative Extension (*Plant Sciences*)  
 Allen E. Van Deynze, Ph.D., Lecturer and Biotechnology Specialist (*Plant Sciences*)  
 Mark Van Horn, M.S., Lecturer (*Plant Sciences*)

### Emeriti

David W. Burger, Ph.D., Professor Emeritus (*Plant Sciences*)  
 James A. Harding, Ph.D., Professor Emeritus (*Plant Sciences*)  
 Theodore M. DeJong, Ph.D., Professor Emeritus (*Plant Sciences*)  
 James E. Hill, Ph.D., Specialist in Cooperative Extension, Emeritus (*Plant Sciences*)  
 John M. Labavitch, Ph.D., Professor Emeritus (*Plant Sciences*)  
 G. Stuart Pettygrove, Ph.D., Emeritus Soils Specialist (*Land, Air and Water Resources*)  
 Richard E. Plant, Ph.D., Professor Emeritus (*Plant Sciences*)  
 Vito S. Polito, Ph.D., Professor Emeritus (*Plant Sciences*)  
 Michael S. Reid, Ph.D., Professor Emeritus (*Plant Sciences*)  
 Mikal E. Salvit, Ph.D., Professor Emeritus (*Plant Sciences*)

**Graduate Study.** The Graduate Group in Horticulture and Agronomy offers programs of study leading to the M.S. and Ph.D. degrees for students interested in the science and management of agricultural crops, including their ecology, physiology, genetics, and post-harvest management, as well as the interaction of agricultural crops with the environment. These programs are designed to focus on a cropping system, such as agronomy, environmental horticulture, pomology, vegetable crops, viticulture and weed science. Within that cropping system, the student can specialize in one of a number of areas, including agroecology, biotechnology, breeding and crop improvement, crop physiology, crop production, floriculture, landscape horticulture, mineral nutrition, modeling, nursery production, pest management, plant growth and development, postharvest physiology, revegetation/restoration, and water relations. Research may be conducted within these areas with an applied or basic focus, but in association with a cropping system.

**Preparation.** For both the M.S. and Ph.D. programs, a level of competence equivalent to that of a sound undergraduate program in Plant Science is required. This includes coursework in general biology, chemistry, organic chemistry, physics, statistics, genetics, plant physiology, and soil science. A few limited deficiencies in any of these areas can be made up after admission to the graduate program. Specific requirements are outlined in detail on the group's website. The graduate adviser, the major professor, and the student will design a program of advanced courses to meet individual academic needs within one of the specializations.

**Graduate Advisers.** Consult the Group office.

### Courses in Horticulture (HRT)

#### Graduate

##### 200A. Horticulture & Agronomy: Principles (4)

Lecture/discussion—4 hours. Prerequisite: graduate standing. Core course to introduce students to the principles that are of general importance in horticultural and agronomic research, including agroecology, plant developmental physiology, crop improvement, and biotechnology. Generally taken in the first year of the graduate program.—F. (F.) Jernstedt

##### 200B. Horticulture & Agronomy: Practices (4)

Lecture/discussion—2 hours; fieldwork—3 hours; seminar—3 hours. Prerequisite: course 200A recommended; graduate standing. Introduction to horticultural and agronomic cropping systems. Covers

current applied research within agroecology, crop improvement, crop production, postharvest biology.—S. (S.) Walker

#### 203. Research Perspectives in Horticulture (3)

Lecture—1 hour; lecture/discussion—2 hours. Prerequisite: Plant Biology 111 and 112, or Environmental Horticulture 102 or the equivalent. Following lectures/discussions of scientific methodology, students develop research proposals aided by classroom discussions and individual interactions with instructors. Lectures and critiques of "classical papers" provide a sense of the evolution of the current concepts in perennial plant biology.—W. (W.) Melotto, Zwieniecki

#### 251. Modeling Horticultural Systems (4)

Lecture—3 hours; laboratory—3 hours. Prerequisite: Plant Sciences 142, calculus, or consent of instructor. Development and application of models. Emphasis on physiological and ecological models, with examples from areas of interest to class participants. Applications to horticultural systems. Offered in alternate years.—(W.) Liebh

#### 290. Seminar (1)

Seminar—1 hour. Prerequisite: graduate standing at UCD. Seminars presented by invited speakers, students, or faculty on selected topics in horticulture. (S/U grading only.)—S. (S.)

#### 298. Group Study (1-5)

F, W, S. (F, W, S.)

#### 299. Research (1-12)

Prerequisite: consent of instructor. Research. May be repeated for credit. (S/U grading only.)—F, W, S, Su. (F, W, S, Su.)

## Human Anatomy

**See Courses in Cell Biology and Human Anatomy (CHA), on page 432.**

## Human and Community Development

**See Human Ecology, on page 373.**

## Human Development

(College of Agricultural and Environmental Sciences)

#### Faculty

See Human Ecology, on page 373.

#### The Major Program

Human development explores the developmental process in humans throughout the life cycle. Biological, cognitive, and personality/sociocultural aspects of development are studied.

**The Program.** Human development majors complete a group of preparatory courses in anthropology, general biology, genetics, history, philosophy, physiology, psychology, and statistics. Upper division students can design their programs in consultation with a faculty member to emphasize a particular interest. For instance, students can study the cognitive, social, and biological aspects of human development while emphasizing child or adult development.

**Internships and Career Alternatives.** At least one practicum course is required. A second practicum or supervised internship can be used to fulfill the restricted elective requirement for the major. In addition, students can intern in schools, early childhood education or senior centers, hospitals, rehabilitation

centers, probation offices, group foster homes, mental health clinics, or as tutors for handicapped or bilingual students. Human development graduates fill a wide variety of positions in preschools, elementary and special educational settings, programs designed for parents, families, and the elderly, as well as governmental jobs related to social services for people of all ages. Students who emphasize biological aspects of human development can apply to medical school or pursue training for positions in the health sciences. Human development prepares students to pursue advanced degrees in behavioral and social sciences, education, social work, family law, or health sciences.

**Preparatory Requirements.** UC Davis students who wish to change their major to Human Development must be in good academic standing. Students must complete the following courses with a combined grade point average of at least 2.500. All of the following courses must be taken for a letter grade:

- Psychology 1
- Statistics 10 or 13 or 13V or Psychology 41
- or Sociology 46A and 46B
- One course from: Anthropology 1, 2 or 15
- One course from: Biological Sciences 2A, 10, 10V; Microbiology 10; Molecular and Cellular Biology 10; or Neurobiology, Physiology, and Behavior 10, 12 or 101

Students must have achieved a 2.000 GPA in any required upper-division courses taken prior to declaring the major.

All courses satisfying the Preparatory Subject Matter, Depth Subject Matter, Restricted Electives and English requirement must be taken for a letter grade.

### B.S. Major Requirements:

	UNITS
<b>Preparatory Subject Matter .....</b>	<b>38-48</b>
Two courses from: Anthropology 1, 1Y, 2, or 15.....	8-9
One course from: Biological Sciences 2A, 10, 10V, Microbiology 10, or Neurobiology, Physiology, and Behavior 12 .....	3-5
One course from: Molecular and Cellular Biology 10 or Biological Sciences 101† ...	4
One course from: History 17A, 17B, 72A, 72B, or Political Science 1 .....	4
Two courses from: Philosophy 5, 15, 30, 31, 32, or 38 .....	8
One course from: Neurobiology, Physiology, and Behavior 10, 101, or Psychology 101 .....	3-5
Psychology 1 .....	4
One course from: Psychology 41 or Sociology 46A and 46B, or Statistics 10 or 13 or 13V .....	4-9

### Depth Subject Matter .....

- Life Span: Human Development 100A, 100B, 100C..... 12
- Research Methods: Human Development 120..... 4
- Biological Processes: one course from: Biological Sciences 101†, Human Development 117, Nutrition 111AV, or Psychology 121 .....
- 3-4
- Social-Cultural Processes: one course from: Human Development 102, 110, 130, or 160..... 4
- Cognitive Processes: one course from: Human Development 101, 103, 132, 161 or 163 .....
- 4
- Practicum: one course from: Human Development 140-140L, or 141 or 142 or 143 .....
- 4-6
- Restricted Electives..... 19-20
- Five additional upper division courses (19-20 units) chosen from among Human Development courses or from a list of restricted electives in consultation with

faculty adviser. May include only one practicum course.

At least one of the courses from the Depth Subject groups or Restricted Electives listed above must focus on childhood/adolescence (101, 102, 103, 110, 130, 132) and one on adulthood/aging (117, 143, 160, 161, 163).

### English Composition Requirement .....

12  
Three courses in English Composition from the following list:

- English 3, University Writing Program 1, 18, 19, 101, 102A, 102B, 102C, 102D, 102E, 102F, 102G, 102H, 102J, 102K, 102L, 104A, 104B, 104C, 104D, 104E, 104F, 104I, Communication 1,
- Comparative Literature 1, 2, 3, 4, or Native American Studies 5.

At least one course must be selected from: University Writing Program 101, 102A-H, 104A-F.

The Upper Division Composition Exam does not satisfy the requirement.

Advanced Placement English score of 4 or 5 which satisfies English 3 and/or University Writing Program 1 will satisfy one of the three required courses.

### Total Units for the Major .....

92-105  
† Biological Sciences 101 cannot be used to satisfy both the Preparatory Subject Matter and the Depth Subject Matter Requirements.

**Major Adviser.** Lisa Miller

### Minor Program Requirements:

The Department of Human and Community Development offers two minors.

### UNITS

### Aging and Adult Development .....

- Three of following courses:  
Human Development 100C, 117, 143, 160, 161, or 163..... 12
- Two courses from the following: Human Development 110; Exercise Biology 117, Psychology 121, 123, 126, 130, or 155..... 6-8

**Minor Adviser.** L. Miller, B. Ober

### UNITS

### Human Development .....

- Human Development 100A and 100B ..... 8
- Human Development 100C or 110 ..... 4
- Two courses from: Human Development 101, 102, 103, 130, 132, 161 or 163 ... 8

**Minor Adviser.** K. Conger

**Graduate Study.** Graduate study is available through a Master of Science degree in child development, and a Ph.D. degree in human development. See also [Graduate Studies](#), on page 120.

### Courses in Human Development (HDE)

Questions pertaining to the following courses should be directed to the instructor or to the Human and Community Development Advising Center in 1303 Hart Hall 530-752-2244.

### Lower Division

#### 12. Human Sexuality (3)

Lecture—3 hours. Vocabulary, structure/function of reproductive system; sexual response; pre-natal development; pregnancy and childbirth; development of sexuality; rape and sexual assault; birth control; sexually transmitted diseases; homosexuality; establishing/maintaining intimacy; sexual dysfunctions; communication; enhancing sexual interaction, cultural differences in attitudes towards sexuality. GE credit: SocSci, Div | ACGH, DD, SS.—F, S. (F, S.)

#### 92. Internship (1-12)

Internship—3-36 hours. Prerequisite: field work experience or at least one course (e.g., course 100A, 100B, 140 or 140L) related to fieldwork assignment; consent of instructor. Supervised intern-

ship, off campus and on campus, in community and institutional setting. May be repeated for credit for a total of 12 units or if involves progressively greater (supervised) participation in program delivery or assessment. (P/NP grading only.)—F, W, S. (F, W, S.)

#### 98. Directed Group Study for Undergraduates (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

#### 99. Special Study for Undergraduates (1-5)

(P/NP grading only.)

### Upper Division

#### 100A. Infancy and Early Childhood (4)

Lecture—4 hours. Prerequisite: Psychology 1, Biological Sciences 1A, or 2A, or 10 or 10V; or Molecular and Cellular Biology 10; or Neurology, Physiology, and Behavior 10 or 12; or Microbiology 10. Biological, social, and cultural influences in the psychological growth and development of children, prenatal through age six. Two observations of preschool children required.—F, W, Su. (F, W, Su.) Hibel

#### 100B. Middle Childhood and Adolescence (4)

Lecture—4 hours. Prerequisite: Psychology 1; and either course 100A or Psychology 140. Interplay of biological and social-cultural factors in the emotional, cognitive and social development from middle childhood through adolescence.—W, S, Su. (W, S, Su.) Guyer, Nishina

#### 100C. Adulthood and Aging (4)

Lecture—4 hours. Prerequisite: Psychology 1. Development during early, middle, and late adulthood; biological, cognitive, and psycho-social aspects of adult development. Emphasis on normative patterns of development which characterize "successful aging."—F, S. Miller, Ober

#### 101. Cognitive Development (4)

Lecture—3 hours; term paper. Prerequisite: course 100A or 100B or Psychology 140. Pass One restricted to Human Development or Psychology majors. Theories, methods, evidence, and debates in the field of cognitive development, such as nature/nurture, constraints on learning, and the role of plasticity. Topics include attention, memory, concepts about the physical and social world, and language. (Same course as Psychology 141.) GE credit: Wrt | WE.—F, W, S. (F, W, S.) Chen, Gibbs, Goodman, Graf Estes, Lagattuta, Rivera

#### 102. Social and Personality Development (4)

Lecture—3 hours; term paper. Prerequisite: course 100A or 100B or Psychology 140. Pass One open to Human Development or Psychology majors. Social and personality development of children, infancy through adolescence. Topics include the development of personality, achievement motivation, self-understanding, sex-role identity, and antisocial behavior. Emphasis on the interface between biological and social factors. (Same course as Psychology 142.) GE credit: SocSci, Wrt | SS, WE.—F, W, S. (F, W, S.) Belsky, Gibbs, Hastings, Thompson

#### 103. Cross-Cultural Study of Children (4)

Lecture—4 hours. Prerequisite: course 100A or Psychology 140; consent of instructor. Cross-cultural studies of children in developing countries and among minority groups in the U.S. GE credit: SocSci, Div | ACGH, DD, SS, WC.—F. (F.)

#### 110. Contemporary American Family (4)

Lecture—4 hours. Prerequisite: Psychology 1 or Sociology 1 or Sociology 2. Factors currently influencing American families including changing economic conditions, changing sex roles, divorce, and parenthood; theories and research on family interaction.—W. (W.) Conger

#### 117. Longevity (4)

Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Nature, origin, determinants, and limits of longevity with particular reference to humans; emphasis on implications of findings from non-human model systems

including natural history, ecology and evolution of life span; description of basic demographic techniques including life table methods. (Same course as Entomology 117.) GE credit: SciEng, Wrt | SE, SL, WE. —F. (W.) Carey

### **120. Research Methods in Human Development (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Statistics 13 or 13V or Education 114 or Psychology 41 or Sociology 46A and 46B. Scientific process, research designs, and experimental controls; APA manuscript style and scientific writing; statistical analysis and interpretation of results. Laboratory exercises to collect data, analyze and interpret results, and write scientific papers. GE credit: SocSci, Wrt | SS, WE. —F, S. (F, S.) Liu, Nishina

### **121. Psychological Assessment (4)**

Lecture—4 hours. Prerequisite: courses 100A or 100B; Statistics 13 or 13V or Psychology 41 or Sociology 46A and 46B. Current issues and methodology related to the process of psychological assessment with children. Offered irregularly.

### **130. Emotionally Disturbed Children (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100A and 100B; or Psychology 140; consent of instructor. Discussion of psychosis, neurosis, behavior disorders, and learning difficulties in children. —W. (W.) Choe

### **132. Individual Differences in Cognition (4)**

Lecture—4 hours. Prerequisite: Psychology 1; course 100A or 100B. Individual differences in cognition, including learning disabilities and giftedness. Education implications and neurodevelopmental substrates of individual differences in cognition. Offered irregularly.

### **140. Communication and Interaction with Young Children (2)**

Lecture—2 hours. Prerequisite: course 100A; concurrent enrollment in course 140L required; consent of instructor. Enrollment requires sign up for laboratory time at the Child and Family Studies Center located at 244 First Street, Davis, CA. Integration of research, theory and practice in child development, emphasizing the role of relationships in creating a growth-promoting environment for young children. Includes: peer relationships, emotional understanding and self regulation, attachment, communication and school readiness. —F, W, S. (F, W, S.) Chen

### **140L. Laboratory in Early Childhood (3-5)**

Laboratory—6-15 hours; laboratory/discussion—3 hours. Prerequisite: course 140, must be taken concurrently for first 3 units of credit; students must contact the Center for Child and Family Studies to enroll; consent of instructor. Limited enrollment. Application of theories of learning and development to interaction with infants, toddlers, and preschoolers at Early Childhood Laboratory. Applied skills in communication, guidance and curriculum. May be repeated two times for credit. (P/NP grading only.) —F, W, S. (F, W, S.) Chen

### **141. Field Study With Children and Adolescents (4-6)**

Lecture—2 hours, fieldwork—6-12 hours. Prerequisite: course 100A or 100B; consent of instructor. Study of children's affective, cognitive and social development within the context of family/school environments, hospitals and foster group homes. May be repeated for credit for a total of 12 units. —F, S. (F, W, S.)

### **142. Field Study with Emotionally Distressed Children and Adolescents (4-6)**

Discussion—1.5 hours; fieldwork—6-12 hours. Prerequisite: course 130 (may be taken concurrently); consent of instructor. Field study with children who are identified as emotionally distressed, including those with internalizing and externalizing behavioral problems. May be repeated for credit for a total of 12 units following consultation with and consent of instructor.

### **143. Field Studies of the Elderly (4-6)**

Discussion—2 hours; field work—6-12 hours. Prerequisite: course 100C or 160 may be taken concurrently; consent of instructor. Apply theory and research on adult development and aging, work with older adults in a variety of settings, and develop skills relevant to that application. Develop a small research project. —W. (W.) Miller, Ober

### **160. Social Aspects of Aging (4)**

Lecture—4 hours. Prerequisite: course 100C. How the social context affects adult development and aging. Emphasis on demography, social policy, culture, and adaptation. Oral histories as class projects. Offered in alternate years. GE credit: Div. —F. (F.)

### **161. Applied Cognition and Aging (4)**

Lecture/discussion—4 hours. Prerequisite: Psychology 1; course 100C. Principles from cognition and aging and applies these to real-world concerns in areas including education, technology, job performance, and health. Considers physical and social changes in later life that impact functioning. Offered in alternate years. GE credit: SocSci, Wrt | SS, WE. —S. (S.) Miller

### **163. Cognitive Neuropsychology in Adulthood and Aging (4)**

Lecture/discussion—4 hours. Prerequisite: Psychology 1; course 100C recommended. Theories, methods, and findings concerning the relationship between cognitive processes and brain functioning. Readings, lectures, and in-class discussions cover research on normal younger and older adults, neuropsychological case studies, and selected patient groups (e.g., amnesia, schizophrenia, Alzheimer's disease). Offered in alternate years. —F. (F.) Ober

### **190C. Introductory Research Conference (1)**

Discussion—1 hour. Prerequisite: involvement in ongoing research; consent of instructor. Instructors lead discussions with undergraduate students who involve themselves in a research project. Research papers are reviewed and aspects of project proposals developed out of class are presented and evaluated. May be repeated for credit. (P/NP grading only.) —F, W, S. (F, W, S.)

### **192. Internship (1-12)**

Internship—3-36 hours. Prerequisite: upper division standing and consent of instructor. Supervised internship off and on campus, in community, and institutional settings. (P/NP grading only.)

### **198. Directed Group Study (1-5)**

(P/NP grading only.)

### **199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.)

### **Graduate**

#### **200A. Early Development (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing; basic biology or physiology; one upper division course in psychology or a related field; one upper division or graduate course in developmental psychology (may be taken concurrently). Theory and research on the biological, social, cognitive, and cultural aspects of development from conception to the age of five years. —F. (F.) Belsky, Chen, Hibel

#### **200B. Middle Childhood and Adolescence (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing; basic biology or physiology, and at least two upper division or graduate-level courses in psychology or related fields. Theory and research on biological, cognitive, social, and cultural influences on behavioral development from age five years until late adolescence. —W. (W.) Choe, Guyer, Nishina

#### **200C. Development in Adulthood (4)**

Lecture/discussion—4 hours. Theory and research focusing on social, personality, cognitive, and biological development from early to late adulthood. Emphasis is on theory development and continuity and change. —S. (S.) Miller, Ober

### **203. Adolescent Behavioral and Emotional Development (4)**

Lecture/discussion—4 hours. Prerequisite: course 200B. Analysis of recent theories, research methods, and major findings on adolescent behavioral and emotional development, including contextual and genetic influences on adolescence, pubertal transitions, and social/family contexts and processes. Emphasis on multi-level mechanisms underlying adolescent behavioral and emotional development. Offered in alternate years.

### **204. Developmental Neuroscience and Adolescent Psychopathology (4)**

Lecture—4 hours. Prerequisite: graduate standing in Human Development, Psychology, Education, Neuroscience or consent of instructor. Introduction to human developmental neuroscience. Understanding of adolescence and its characterization as a time of risky and unhealthy behavior and vulnerability to onset of mental disorder as well as issues around plasticity of the adolescent brain and prevention/intervention. Offered in alternate years. —(W.) Guyer

### **205. Path Analysis, Factor Analysis, and Structural Equation Modeling (4)**

Lecture—4 hours. Prerequisite: Psychology 204B or equivalent graduate courses in statistics or permission of the instructor; familiarity with multiple regression and the basics of matrix algebra. Graduate standing in HDGG, Psychology, Sociology, Education, or a related social science, or permission of the instructor. Introduction of basic concepts, principles, and applications of structural equation modeling including path analysis, confirmatory factor analysis, multiple-group modeling, and latent growth curve modeling. Offered in alternate years.

### **207. Topics in Applied Cognitive Aging (4)**

Lecture/discussion—2 hours. Prerequisite: graduate standing in Human Development Graduate Group, Psychology, Education, or a related social science, or consent of the instructor. Apply principles from cognitive aging to real-world concerns in areas such as education, technology, job performance, and health. Examine how physical and social changes occurring in later life impact functioning. Offered in alternate years. —F. Miller

### **210. Theories of Behavioral Development (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing in behavioral sciences. Consideration of enduring issues in theories of behavioral development; analysis of adequacy of major theoretical schools (e.g., social learning, Piagetian) as scientific theories. Offered in alternate years.

### **211. Physiological Correlates of Behavioral Development (4)**

Seminar—4 hours. Prerequisite: consent of instructor. An overview of mechanisms of organismic development and the implications of developmental biology for the analysis of behavioral ontogeny; consideration of parallels between processes of organismic development and behavioral development in children and infra-human mammals. Offered in alternate years. —(S.)

### **220. Research Methods in Human Growth and Development (4)**

Lecture—4 hours. Prerequisite: Statistics 13 or the equivalent and at least two upper division courses in Human Biology or Developmental Psychology. Overview of qualitative and quantitative approaches to empirical inquiry in the social sciences, with a focus on theory and research methods in biological growth and cognitive and social/emotional development from prenatal period to death. —W. (W.) Liu

### **232. Cognition and Aging (3)**

Lecture/discussion—3 hours. Prerequisite: course 200C. The manner in which cognitive processes are affected by aging as well as an understanding of the changes in the central nervous system occurring with aging. Offered in alternate years. —Ober

**234. Children's Learning and Thinking (3)**

Seminar—3 hours. Prerequisite: course 200A or Psychology 212 recommended. Analysis of theories, research methods, and major findings of children's higher-order cognition, including origins of knowledge, development of problemsolving skills, reasoning strategies, and scientific concepts, with an emphasis on the underlying mechanism involved in children's thinking and learning processes. Offered in alternate years.—(S.) Chen

**238. The Context of Individual Development (3)**

Lecture/discussion—3 hours. Prerequisite: graduate standing in Human Development, Child Development, Education, Psychology, Anthropology, Sociology, or consent of instructor. Analysis of human development within the context of daily life. Contextualizing theories and methods of developmental psychology will be distinguished from contextual theories and methods. Developmental psychology models will be distinguished from child psychology models. Offered in alternate years.

**239. Developmental Trajectories in Typical and Atypical Children; Birth to Five (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing in Human Development, Psychology, Sociology, a related social science, or permission of the instructor. Discuss theories of development in typical and atypical children from birth to five from a socio-cultural perspective including parent-child interaction, peer interactions, cultural contexts of learning, as well as theoretical and empirical issues for understanding continuities and discontinuities in development. Offered in alternate years.—S.

**240. Peer Relationships During Adolescence (4)**

Lecture/discussion—4 hours. Graduate standing in Human Development, Psychology, Education, or consent of instructor. Course examines the role of peer relationships in adolescent development including forms and functions at the individual, dyadic and group levels. Ethnicity and cross cultural research will be discussed. Emphasis on methodology, including surveys, peer nominations/sociometrics, experimental, and observational designs. Offered irregularly.—K. Conger

**250. Current Research on Family Relationships (4)**

Lecture/discussion—6 hours; term paper. Graduate standing in Human Development Graduate Group, Psychology, Sociology, a related social science, or consent of instructor. Discussion of theories, methods, and current research on the nature and development of sibling, romantic, and parent-child relationships across the lifespan. Emphasis on interpersonal and family processes examined in ethnic/cultural contexts. Implications for individual development will be addressed.—S. K. Conger

**252. Family Research, Programs and Policy (4)**

Seminar—3 hours; term paper. Graduate standing in Human Development, Psychology, Sociology, related social sciences, or consent of instructor. Course examines the competing interests of research, policy, and service on current issues of family functioning and individual well being. The course considers communication barriers between researchers, practitioners, and policy makers. Offered in alternate years.—(S.) K. Conger

**290. Seminar (3)**

Seminar—3 hours. Discussion and evaluation of theories, research, and issues in human development. Different topics each quarter.—F, W, S. (F, W, S.)

**290C. Research Conference (1)**

Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Supervising instructors lead research discussions with their graduate students. Research papers are reviewed and project proposals are presented and evaluated. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**291. Research Issues in Human Development (4)**

Seminar—4 hours. Prerequisite: graduate standing in the Behavioral Sciences. In-depth presentations of research issues in particular areas of behavioral development.—F, W. (F, W.) R. Conger

**292. Graduate Internship (1-12)**

Internship—3-36 hours. Prerequisite: consent of faculty (internship sponsor) and satisfactory completion of placement-relevant course work, for example: Education 213, 216; course 222, 242; Law 272, 273. Individually designed supervised internship, off campus, in community or institutional setting. Developed with advice of faculty mentor. May be repeated for credit up to 12 units if justified skill acquisition and promise of informing evaluation research. (S/U grading only.)—F, W, S. (F, W, S.)

**298. Group Study (1-5)****299. Research (1-12)**

(S/U grading only.)

**Professional****396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## Human Development (A Graduate Group)

Katherine J. Conger, Ph.D., Group Chairperson

**Group Office.** 1315 Hart Hall

530-754-4109;

<http://humandevelopment.ucdavis.edu>

**Faculty**

Len Abbedutto, Ph.D., Professor (*Psychiatry and Behavioral Sciences and Director, M.I.N.D. Institute*)

Jay Belsky, Ph.D., Distinguished Professor (*Human Ecology*)

Zhe Chen, Ph.D., Professor (*Human Ecology*)

Daniel E. Choe, Ph.D., Assistant Professor (*Human Ecology*)

Katherine J. Conger, Ph.D., Professor (*Human Ecology*)

Nancy Erbstein, Ph.D., Assistant Researcher (*Human Ecology*)

Emilio Ferrer, Ph.D., Professor (*Psychology*)

Lorena Garcia, M.P.H., Dr.P.H., Assistant Professor (*Public Health Sciences*)

Kevin Gee, Ph.D., Assistant Professor (*Education*)

Beth Goodlin-Jones, Ph.D., Associate Professor (*Psychiatry, M.I.N.D. Institute*)

Gail Goodman, Ph.D., Professor (*Psychology*)

Katharine Graf Estes, Ph.D., Associate Professor (*Psychology*)

Amanda Guyer, Ph.D., Professor (*Human Ecology, Center for Mind and Brain*)

Randi Hagerman, M.D., Professor (*M.I.N.D. Institute*)

Robin L. Hansen, M.D., Professor (*Pediatrics*)

Paul Hastings, Ph.D., Professor (*Psychology*)

David Hesl, Ph.D., Associate Clinical Professor (*Psychiatry, M.I.N.D. Institute*)

Leah Hibel, Ph.D., Associate Professor (*Human Ecology*)

Ladson Hinton, M.D., Professor (*Psychiatry and Behavioral Sciences*)

Suad Joseph, Ph.D., Professor (*Anthropology*)

Penelope Knapp, M.D., Professor (*Psychiatry, M.I.N.D. Institute*)

Siwei Liu, Ph.D., Assistant Professor (*Human Ecology*)

McDonald, Craig, M.D., Professor (*Physical Medicine Rehabilitation*)

Lisa Miller, Ph.D., Professor (*Human Ecology*)

Peter Mundy, Ph.D., Professor (*Education, M.I.N.D. Institute*)

Adrienne Nishina, Ph.D., Associate Professor (*Human Ecology*)

Lisa Oakes, Ph.D., Professor

(*Psychology, Center for Mind and Brain*)

Beth A. Ober, Ph.D., Professor

(*Human Ecology*)

Lenna Ontai, Ph.D., Associate Specialist in

Cooperative Extension (*Human Ecology*)

Susan Rivera, Ph.D., Professor

(*Psychology, Center for Mind and Brain*)

Richard W. Robins, Ph.D., Professor (*Psychology*)

Sally Rogers, Ph.D., Professor

(*Psychiatry, M.I.N.D. Institute*)

Julie Schweitzer, Ph.D., Associate Professor

(*Psychiatry, M.I.N.D. Institute*)

Phillip Shaver, Ph.D., Professor (*Psychology*)

Martin Smith, Ph.D., Specialist in Cooperative

Extension (*Human Ecology*)

Emily Solari, Ph.D., Assistant Professor (*Education*)

Marjorie Solomon, Ph.D., Associate Professor

(*Psychiatry and Behavioral Sciences; M.I.N.D. Institute*)

Tamara Swaab, Ph.D., Associate Professor

(*Psychology*)

Ross A. Thompson, Ph.D., Professor (*Psychology*)

Susan Timmer, Ph.D., Clinical Specialist (*Pediatrics*)

Yuuko Uchikoshi Tonkovich, Assistant Professor

(*Education*)

Brian Trainor, Ph.D., Associate Professor

(*Psychology*)

Kali Trzesniewski, Ph.D., Associate Specialist in Cooperative Extension (*Associate Director of Research for statewide 4-H Youth Development Program; Human Ecology*)

Anthony Urquiza, Ph.D., Psychologist (*Pediatrics*)

Karen Watson-Gegeo, Ph.D., Professor (*Education*)

*Distinguished Graduate Mentoring Award*

**Affiliated Faculty**

Kristin Alexander, Ph.D., Associate Professor (*California State University, Sacramento*)

Keith Widaman, Ph.D., Professor (*UC Riverside, Psychology*)

**Graduate Study.** The interdisciplinary and inter-departmental Graduate Group in Human Development offers a program of study leading to the Ph.D. degree. The program provides lifespan study of human behavioral development, with a balance of emphasis on biological, cognitive, and socio-emotional development in context. Recipients of the degree will be prepared to teach, to conduct research, and to be actively involved in public service in human behavioral development.

Applicants seeking admissions and fellowships consideration must submit all materials by our priority December 15 deadline. The final admissions deadline is March 1. See our website for more details.

**Graduate Adviser.** Contact the Group office.

## Human Ecology

Formerly Human and Community Development

(College of Agricultural and Environmental Sciences)

Luis E. Guarnizo, Ph.D., Community and Regional Development Program, Chairperson of the Department

Lisa Miller, Ph.D., Human Development and Family Studies Program, Vice-Chairperson of the Department

**Department Advising Office.** 1303 Hart Hall 530-752-2244, 530-752-1805; <http://hcd.ucdavis.edu>

## Faculty—Community and Regional Development

Catherine Brinkley, V.M.D, Ph.D., Assistant Professor

Ryan Galt, Ph.D., Associate Professor

Luis E. Guarnizo, Ph.D., Professor

Martin F. Kenney, Ph.D., Professor

William Lacy, Ph.D., Professor

Jonathan London, Ph.D., Associate Professor

Thomas Tomich, Ph.D., Professor

M. Anne Visser, Ph.D., Assistant Professor

## Affiliated Faculty

David Campbell, Ph.D., Specialist in Extension  
 Clare Gupta, Ph.D., Assistant Specialist in Cooperative Extension  
 Laurie Lippin, Ph.D., Continuing Lecturer  
 Bernadette Tarallo, Ph.D., Continuing Lecturer  
 Robert Wiener, Ph.D., Continuing Lecturer

## Emeriti Faculty

Stephen Brush, Ph.D., Professor Emeritus  
 Isao Fujimoto, Ph.D., Lecturer SOE Emeritus  
 James I. Grieshop, Ph.D., Specialist in Cooperative Extension Emeritus  
 Frank Hirtz, Ph.D., Sr. Lecturer SOE Emeritus  
 Michael P. Smith, Ph.D., Distinguished Professor Emeritus  
 Miriam Wells, Ph.D., Professor Emerita  
 Alvin D. Sokolow, Ph.D., Specialist in Cooperative Extension Emeritus  
 Janet Momsen, Ph.D., Professor Emerita

## Faculty—Human Development and Family Studies

Jay Belsky, Ph.D., Distinguished Professor  
 Zhe Chen, Ph.D., Professor  
 Daniel Ewon Choe, Ph.D., Assistant Professor  
 Katherine Conger, Ph.D., Professor  
 Amanda Guyer, Ph.D., Professor  
 Leah Hibell, Ph.D., Associate Professor  
 Siwei Liu, Ph.D., Assistant Professor  
 Lisa Miller, Ph.D., Professor  
 Adrienne Nishina, Ph.D., Associate Professor  
 Beth A. Ober, Ph.D., Professor

## Affiliated Faculty

Nancy Erbstein, Ph.D., Assistant Researcher  
 Jennifer Gonzales, Child Development Demonstration Lecturer, Continuing  
 Julia Luckenbill, Child Development Demonstration Lecturer, Continuing  
 Lenna Ontai Ph.D., Associate Specialist in Cooperative Extension  
 Barbara Shebloski, Continuing Lecturer  
 Martin Smith, Ph.D., Specialist in Cooperative Extension  
 Kali Trzesniewski, Ph.D., Associate Specialist in Cooperative Extension  
 Kelly Twibell, Child Development Demonstration Lecturer, Continuing Lecturer

## Emeriti Faculty

Keith Barton, Ph.D., Professor Emeritus  
 Brenda Bryant, Ph.D., Professor Emerita  
 Rand Conger, Ph.D., Professor Emeritus  
 Rosemarie Kraft, Ph.D., Lecturer SOE, Emerita  
 Lawrence V. Harper, Ph.D., Professor Emeritus  
 Richard Ponciano, Ph.D., Extension Specialist Emeritus  
 Emmy E. Werner, Ph.D., Extension Specialist Emerita

**Major Programs & Courses.** See *Community and Regional Development*, on page 221 and *Human Development*, on page 370.

# Human Rights

(College of Letters and Science)

<http://humanrightsminor.ucdavis.edu>

The interdisciplinary minor in Human Rights gives students a chance to explore human rights as both a specific issue and within larger contexts through a wide variety of disciplines and courses.

Courses in the minor provide students with an opportunity to approach human rights as a practical, as well as an intellectual problem. The minor will be of special interest to students majoring in area studies and those planning to pursue careers in public service, law and international relations. Students will take courses in which human rights problems are the central focus of the course and other courses, which while not having human rights as their central theme, include elements that address the history, theory, practice, violation, promotion and protection of human rights, or in which students have the opportu-

nity to conduct research projects relevant to the study of human rights.

The minor is sponsored by the Religious Studies Program.

## Program Objectives

In addition to completing Religious Studies 90 or 134, students must take two additional Core Courses and two from the Elective Course list. Students must select courses from at least three different departments or programs to satisfy minor requirements.

## Minor Program Requirements:

HUMAN RIGHTS .....	UNITS
--------------------	-------

Religious Studies 90 or 134 ..... 4

Choose two core courses from the following\*: History 142A, Religious Studies 131, Sociology 104, Spanish 159† ..... 8

Choose two elective courses from the following: American Studies 156, Anthropology 123B, 126B, 130A, 131, Chicana/o Studies 131/131S, 150, English 107, History 142A, 142B, 172, 177A, 177B, 183A, 183B, 189, Native American Studies 115, 130B, 130C, 157, Religious Studies 131, 167, Sociology 104, 130, 137, 157, 160, 171, Spanish 159‡, 175§, Women's Studies 102, 140, 170, 182 .... 8

\* With prior permission of the Interdisciplinary Minor in Human Rights adviser, students may substitute one course from the list of electives as a core course.  
 † When taught as "Witnessing in Latin America: Trauma, Violence and Memory."  
 ^ Only if topic is related to human rights.  
 Prior approval from minor adviser is required."

**Advising.** Religious Studies Program office, 213 Sproul Hall 530-752-1219

## Courses in Human Rights (HMR)

### Lower Division

#### 1. Human Wrongs/Human Rights (4)

Lecture—3 hours; discussion—1 hour. Introduction to Human Rights and the problems they seek to address. Using key episodes of inhumanity like slavery, genocide, and racism. Examines how international movements for social justice led to the emergence of the international Human Rights system. GE credit: ArtHum or SocSci | AH or SS, WC, WE.—F. (F.) Watenpaugh

### Upper Division

#### 120A. Art, Architecture, and Human Rights (4)

Lecture/discussion—4 hours. Prerequisite: consent of instructor. Study of human rights as they relate to art, architecture, and cultural heritage. Examines museums, art collections, and cultural-heritage management, their relation to the cultural prerogatives of communities and indigenous groups, and protection of cultural heritage during war and conflict. (Same course as Art History 120A.) Offered in alternate years. GE credit: ArtHum or SocSci | AH or SS, DD, WL, WC.—(W.) Watenpaugh

#### 130. Special Topics in Human Rights (4)

Lecture/discussion—3 hours; term paper. Prerequisite: course 134 or Religious Studies 134 recommended. Thematic study of human rights. Topics may include contemporary or historical issues in the promotion, protection, and violation of human rights; human rights and the arts, religion, literature are possible topical areas. No credit for students who have completed Religious Studies 90. (Same course as Religious Studies 134) May be repeated for credit when topic differs. Offered irregularly. GE credit: ArtHum or SocSci | AH or SS, WC, WE.—S. Watenpaugh

## 131. Genocide (4)

Lecture/discussion—3 hours; term paper or discussion—1 hour. Prerequisite: upper division standing. Comparative and critical study of the modern phenomenon of genocide from religious, ethical and historical perspectives. (Same course as Religious Studies 131.) GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, VL, WC, WE.—W. (W.) Watenpaugh

## 134. Human Rights (4)

Lecture/discussion—3 hours; term paper or discussion—1 hour. Introduction to the interdisciplinary study of the origins, evolution, denial and protection of Human Rights. No credit for students who have completed Religious Studies 90. (Same course as Religious Studies 134.) GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.—F. (F.) Watenpaugh

## 136. Human Rights in the Middle East (4)

Lecture/discussion—3 hours; term paper. Study of the experience of Human Rights in the modern Middle East, with special attention to the Human Rights issues raised by events of Arab Spring; Palestine-Israel conflict; history of genocide, mass killing and totalitarianism in the region. Offered in alternate years. GE credit: ArtHum or SocSci | AH or SS, WC, WE.—S. (S.) Watenpaugh

## 138. Human Rights, Gender, and Sexuality (4)

Lecture/discussion—3 hours; term paper. Gender and sexuality in the context of human rights. Topics include women's participation in the public sphere, the right to change gender, the right for family privacy, and the right to marriage. (Same course as Religious Studies 138.) Offered in alternate years. GE credit: ArtHum | AH, WC, WE.—F, W, S, Su. (F, W, S, Su.) O'Keefe

## 161. Human Rights in Latin America (4)

Lecture—3 hours; term paper. History of the origins, denial and protection of Human Rights in Latin America. Emphasis on dictatorships, political violence, social resistance, democracy, justice, accountability, truth commissions, memory. (Same course as History 161.) Offered in alternate years. GE credit: ArtHum or SocSci | AH or SS, VL, WC, WE.—S. Schlotterbeck

## 198. Directed Group Study (1-4)

Prerequisite: consent of instructor. Group study on focused topics in human rights. May be repeated for credit. (P/NP grading only.)

## 199. Special Study for Advanced Undergraduates (1-5)

Prerequisite: consent of instructor. Opportunity for advanced undergraduate students to work with a faculty member in a focused manner on a topic or topics of human rights. May be repeated for credit. (P/NP grading only.)

### Graduate

#### 200A. History, Theory and Criticism of Human Rights (4)

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Restricted to graduate students. Introduces the advanced study of Human Rights and the theoretical and practical elaboration of the international Human Rights system. Seminar will engage with criticism of Human Rights and develop research and teaching within disciplinary and interdisciplinary frameworks. (Same course as Study of Religion 231E.) Offered in alternate years.—W. Watenpaugh

#### 200B. Memory, Culture, and Human Rights (4)

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Restricted to graduate students. Explores the multiple convergences among memory, culture, and human rights. Discusses diverse approaches to how societal actors in different historical, cultural, and national settings, construct meanings of past political violence, inter-group conflicts, and human rights struggles. (Same course as Cultural Studies 210.) Offered in alternate years.—F. Lazzara

**298. Group Study (1-4)**

Prerequisite: consent of instructor. Restricted to graduate students. Group study on focused topics in human rights. Four-unit courses may serve as electives for the Designated Emphasis in Human Rights. May be repeated up to 16 units for credit when topic differs. Offered irregularly. (S/U grading only.) –F, W, S. (F, W, S.)

**299. Individual Study (1-12)**

Prerequisite: consent of instructor. Restricted to graduate students. Individual study for the designated emphasis in human rights. (S/U grading only.) May be repeated for credit.

## Humanities

(College of Letters and Science)

Eric L. Russell, Ph.D. (*French and Italian*)

**Program Office.** 213 Sproul  
530-752-1219; <http://humanities.ucdavis.edu>

**Committee in Charge**

Seeta Chaganti, Ph.D. (*English*)  
Liza Grandia, Ph.D. (*Native American Studies*)  
Noah Gwynn, Ph.D. (*French and Italian*)  
John Slater, Ph.D. (*Spanish and Portuguese*)

**The Program of Study**

The Humanities program is an undergraduate and graduate curriculum emphasizing innovative approaches to ideas that matter. Courses offered through the program are interdisciplinary in scope and aim to develop critical thinking and writing skills in three principal areas: major figures, works, and genres in world cultures; major themes in world literatures; and relationships between history, society, and culture.

**Courses in Humanities (HUM)****Lower Division****1. Humanities Forum (2)**

Lecture—2 hours. Reading and discussion of a single work representative of a particular culture, historical period, or genre and significant for its ongoing cultural impact in the humanities, sciences, social sciences, technology, and popular arenas. Attention to provocative implications for contemporary society. May be repeated one time for credit if topic differs. GE credit: ArtHum | AH.

**1D. Issues and Concepts in the Humanities (2)**

Discussion—2 hours. Prerequisite: course 1 concurrently. Small group discussions and preparation of short papers for course 1. May be repeated one time for credit if topic differs. GE credit: ArtHum, Wrt | AH, WE.

**2A. Global Humanities Forum (4)**

Lecture—3 hours; extensive writing. Introduction to humanities topics and methodologies; analysis of major figures, works, and genres in world arts and literatures, with emphasis on relationships between history, society, and culture. May be repeated one time for credit if topic differs. GE credit: ArtHum | AH, WC, WE.

**2B. American Humanities Forum (4)**

Lecture—3 hours; extensive writing. Introduction to humanities topics and methodologies; analysis of major figures, works, and genres in American arts and literatures, with emphasis on relationships between history, society, and culture. May be repeated one time for credit if topic differs. GE credit: ArtHum | ACGH, AH, WE.

**3. Medicine and Humanities (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: completion of Subject A requirement. Evolution of the “medical arts” into the “science of medicine.” The culture of medicine in the context of society, medical ethics. GE credit: ArtHum or SocSci, Wrt | AH or SS, WE.

**4. Animals and Human Culture (2)**

Lecture—2 hours. The meaning of human relations with animals studied across a variety of historical periods and culture and from a variety of humanistic perspectives. GE credit: ArtHum, Wrt | AH.

**4D. Animals and Human Culture Discussion (2)**

Discussion—2 hours. Prerequisite: concurrent enrollment in course 4. Small group discussions and preparation of short papers for course 4. GE credit: ArtHum, Wrt | AH, WE. –F.

**7. Travel and Travel Literature (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: Subject A requirement. History of travel from the age of exploration to the modern era. Contemporary trends in travel, including mass tourism, adventure travel, and ecotourism. Social, economic, and cultural issues related to modern trends in travel. Analysis of literary representations of travel. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

**8. Introduction to Perspectives on Narrative (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: satisfaction of Subject A requirement. Interdisciplinary approach to the use of story across time, culture, and discipline. How the telling and retelling of particular stories reflect the values, concerns, and assumptions of their original audiences and genres. GE credit: ArtHum or SocSci, Div, Wrt | AH, WE.

**9. Don Quixote and the Modern World (2)**

Lecture—2 hours. Reading Don Quixote as emblem of modernity in the West. Issues of reality versus illusion, heroism, freedom and self-fulfillment, racial tolerance and love. Don Quixote in other cultural and popular media: film, dance, art, musical drama, and television. GE credit: ArtHum, Wrt | AH, WC.

**9D. Don Quixote and the Modern World Discussion (2)**

Discussion—2 hours. Prerequisite: course 9 concurrently. Small group discussions and preparation of short papers for course 9. GE credit: ArtHum | AH, WC, WE.

**13. Witches: Myth and Historical Reality (4)**

Lecture—3 hours; extensive writing. This course examines the historical construction of the witch. The four areas covered are: European pagan religions and the spread of Christianity; the “Burning’ Times” in early modern Europe; 17th-century New England and the Salem witch trials; and fairytales. GE credit: ArtHum, Div, Wrt | AH, WC, WE. –Krimmer

**15. Language and Identity (4)**

Lecture/discussion—3 hours; extensive writing. Introduction to topics related to the construction of identity through language use, including geographical and social factors affecting language groups. Language ideology affecting linguistic groups, including bilinguals and non-native speakers of English. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WE.

**60. Narrative and Argumentative Approaches to Major Current Issues in the Media, Culture, and Society (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: English A or the equivalent. Interdisciplinary approach to contemporary issues (abortion, AIDS, civil rights, war and peace, welfare state) around which individuals, communities and institutions define themselves in American society, by applying principles of narrative theory to the narratives where those issues are embedded. GE credit: ArtHum or SocSci, Div, Wrt | AH, WE.

**92. Internship (1-12)**

Internship—3-36 hours. Internships in fields where students can practice their skills. May be repeated for credit. (P/NP grading only.)

**Upper Division****144. Marx, Nietzsche, Freud (4)**

Lecture/discussion—3 hours; term paper. Study of major texts of Marx, Nietzsche, and Freud, selected with an eye to their impact on 20th-century economics, ethics, and attitudes toward eros. Particular

focus on conceptions of the self and the individual's relation to society. (Same course as German 144.) GE credit: ArtHum, Wrt | AH, WC.

**180. Topics in the Humanities (4)**

Lecture/discussion—3 hours; term paper. Analysis of interdisciplinary issues in the Humanities. Topics will vary. May be repeated one time for credit. GE credit: ArtHum, Wrt | AH, WE.

**192. Internship (1-12)**

Internship—3-36 hours. Internships in fields where students can practice their skills. May be repeated for credit. (P/NP grading only.)

**198. Directed Group Study (1-4)**

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-4)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate****250. Topics in the Humanities (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Topics in the humanities, selected by the instructor. May be repeated one time for credit.

**292. Graduate Internship (1-15)**

Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: consent of instructor required. Individually designed supervised internship, off campus, in community or institutional setting. Developed with advice of faculty mentor. May be repeated for credit up to 15 units. (S/U grading only.)

**298. Directed Group Study (1-5)**

(S/U grading only.)

**299. Individual Research (1-4)**

Individual research in the humanities resulting in a formal written research report. (S/U grading only.)

**Professional****396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing; consent of instructor. May be repeated for credit. (S/U grading only.)

## Hydrologic Sciences (A Graduate Group)

Gregory Pasternack, Ph.D., Chairperson of the Group

**Group Office.** 1152 Plant and Environmental Sciences Building 530-752-1669;  
<http://hsgg.ucdavis.edu>

**Faculty**

Fabian Bombardelli, Ph.D., Assistant Professor (*Civil and Environmental Engineering*)

William Casey, Ph.D., Professor (*Chemistry*)

Randy Dahlgren, Ph.D., Professor

Academic Senate Distinguished Teaching Award

Helen Dahlke, Ph.D., Assistant Professor

Graham Fogg, Ph.D., Professor

Timothy Ginn, Ph.D., Professor

(*Civil and Environmental Engineering*)

Mark Grismer, Ph.D., Professor

Peter Hernes, Ph.D., Associate Professor

Jan Hopmans, Ph.D., Professor

William Horwath, Ph.D., Professor

John Largier, Ph.D., Professor (*Bodega Marine Laboratory*)

Mark Lubell, Ph.D., Professor (*Environmental Science and Policy*)

Jay Lund, Ph.D., Professor (*Civil and Environmental Engineering*)

Douglas Mackay, Ph.D., Adjunct Professor

Gregory Pasternack, Ph.D., Professor

Kyaw Tha Paw U, Ph.D., Professor

Carlos Puente, Ph.D., Professor

Samuel Sandoval Solis, Assistant Professor, Cooperative Extension Specialist

S. Geoffrey Schladow, Ph.D., Professor (*Civil and Environmental Engineering*)  
 Kate Scow, Ph.D., Professor  
 Wendy K. Silk, Ph.D., Professor  
 Susan Ustin, Ph.D., Professor  
 Wesley Wallender, Ph.D., Professor  
 Tom Young, Professor (*Civil and Environmental Engineering*)  
 Minghua Zhang, Ph.D., Adjunct Professor  
 Robert Zierenberg, Ph.D., Professor (*Geology*)

### Emeriti Faculty

Charles Goldman, Professor Emeritus  
 Theodore Hsiao, Ph.D., Professor Emeritus  
 Jeffrey Mount, Ph.D., Professor Emeritus (*Geology*)  
 Miguel Marino, Ph.D., Distinguished Professor Emeritus  
 Paul Sabatier, Ph.D., Professor Emeritus (*Environmental Science and Policy*)  
 Bryan Wearn, Ph.D., Professor Emeritus

### Affiliated Faculty

Roger Bales, Ph.D., Professor (*UC Merced School of Engineering*)  
 Philip Duffy, Ph.D., Adjunct Associate Professor (*School of Natural Resources, U.C. Merced*)  
 Stephen Graffan, Ph.D., Water Relations Specialist  
 Thomas Harter, Ph.D., Cooperative Extension Specialist  
 Pramod Pandey, Ph.D., Cooperative Extension Specialist (*Population Health and Reproduction*)  
 Richard Snyder, Ph.D., Biometeorologist Specialist  
 Kenneth Tate, Specialist in Cooperative Extension (*Plant Sciences*)  
 Josh Viers, Associate Professor (*UC Merced*)  
 Daniela Zaccaria, Ph.D., Cooperative Extension Specialist

**Graduate Study.** The Graduate Group in Hydrologic Sciences is an interdisciplinary program offering M.S. and Ph.D. degrees. Course work is available from many programs, including Hydrologic Sciences, Civil and Environmental Engineering, Geology, and Soil Science. Education in the group broadens the skills and knowledge of the physical science or engineering student interested in the occurrence, distribution, circulation and properties of water on earth. Because of water's ubiquity and importance to physical, chemical and biological processes, hydrologic sciences involve the geologic, atmospheric and oceanic sciences, as well as engineering and other applied physical sciences. Basic to the program are core courses in fluid dynamics, hydrologic phenomena, hydrobiology, hydrogeochemistry, hydrologic techniques, and hydrologic policy. Students can pursue specializations in hydrogeochemistry, surface hydrology, subsurface hydrology, irrigation and drainage, watershed hydrology and water resources management. The subsurface hydrology specialization includes hydrogeology and vadose-zone hydrology.

**Preparation.** Applicants to the program are expected to have completed or to be completing an undergraduate degree in environmental or physical sciences, mathematics, or engineering. Undergraduate study must include one year each of calculus, of physics with calculus, and of chemistry. A second year of vector calculus, linear algebra and differential equations is recommended and will be required, before completion of graduate work. Additional courses in applied statistics, computer programming, and geology are recommended.

**Specialization.** Each student will pursue an individual program of advanced study under the direction of a group of faculty members with similar interests but diverse backgrounds. Course work in addition to the above is typically taken in the most appropriate departments.

**Graduate Adviser.** Peter Hernes, Ph.D., and Carlos Puente, Ph.D.

**Graduate Admissions Adviser.** Mark E. Grismer, Ph.D.

## Courses in Hydrologic Sciences (HYD)

### Graduate

#### 200. Survey of Hydrologic Sciences (1)

Seminar—1 hour; term paper. Prerequisite: open to students in the Hydrologic Sciences program. Seminar course exposes students to the diversity of sciences involved in the program. Students prepare a paper and presentation in their area of research interest. May be repeated two times for credit. (S/U grading only.)—F. (F.) Grismer

#### 205. Continuum Mechanics of Natural Systems (4)

Lecture/discussion—4 hours. Prerequisite: Mathematics 21D and 22B, Physics 9B. Continuum mechanics of static and dynamic air, water, earth and biological systems using hydraulic, heat and electrical conductivity; diffusivity; dispersion; strain; stress; deformation gradient; velocity gradient; stretch and spin tensors. (Same course as Biological Systems Engineering 205.)

#### 210. Vadose Modeling and Characterization (3)

Lecture—1.5 hours; laboratory—3 hours; discussion—0.5 hours. Prerequisite: Soil Science 107, or consent of instructor. Principles and modeling of water flow and chemical transport in the vadose zone, with specific applications to soils. Topics include hydraulic properties, finite difference application to unsaturated water flow, parameter optimization, diffusive and convective transport in gaseous and liquid phases. Offered in alternate years.—S. Hopmans

#### 243. Water Resource Planning and Management (3)

Lecture—3 hours. Prerequisite: course 141 or Civil and Environmental Engineering 142. Applications of deterministic and stochastic mathematical programming techniques to water resource planning, analysis, design and management. Water allocation, capacity expansion, and reservoir operation. Conjunctive use of surface water and groundwater. Water quality management. Irrigation planning and operation models. (Same course as Biological Systems Engineering 243.)

#### 245. Climate Change, Water and Society (4)

Lecture—4 hours. Class size limited to 25 students. Integration of climate science and hydrology with policy to understand hydroclimatology and its impact upon natural and human systems. Assignments: readings, take-home examination on climate and hydrologic science, paper that integrates course concepts into a research prospectus or review article. (Same course as Atmospheric Science 245 and Ecology 245.)—F. (F.) Fogg, Lubell, Ullrich

#### 252. Hillslope Geomorphology and Sediment Budgets (4)

Lecture—3 hours; fieldwork—3 hours. Prerequisite: course 141 or Geology 35 or Civil and Environmental Engineering 142 or consent of instructor. Exploration of theoretical and empirical foundations of sediment production on hillslopes using computer models and field experiments to promote an understanding of how watersheds evolve naturally and with human impacts. Offered irregularly.—S. (S.) Pasternack

#### 254Y. Ecohydraulics (3)

Web virtual lecture—1 hour; discussion—1 hour; extensive problem solving. Use of 2D hydrodynamic modeling to perform instream flow assessment by exploring flow-dependent hydraulic patterns at multiple spatial scales and extrapolating results with empirical and analytical functions to evaluate geomorphic resilience and ecological functions. Offered in alternate years.—F. Pasternack

#### 256. Geomorphology of Estuaries and Deltas (4)

Lecture—3 hours; fieldwork—3 hours. Prerequisite: course 141 or Geology 35 or Civil and Environmental Engineering 42 or consent of instructor. Survey of the processes and landforms associated with sedi-

ment deposition in the coastal zone. Application of geomorphic principles to coastal management issues. Offered irregularly.—S. (S.) Pasternack

#### 264. Modeling of Hydrologic Processes (3)

Lecture—3 hours. Prerequisite: course 141 or the equivalent and Statistics 102 or the equivalent. Techniques used to model the spatio-temporal structure of rainfall and runoff are introduced. Procedures studied include those based on stochastic point processes, chaos theory, fractal geometry, and fractional noises. Offered in alternate years.—(S.) Puente

#### 269. Numerical Modeling of Groundwater Systems (3)

Lecture—3 hours. Prerequisite: course 145A or Civil Engineering 144 and course 145B, Mathematics 22B. Finite difference and finite element techniques in modeling groundwater flow and transport. Fundamentals of constructing and calibrating models with hands-on applications. Methods and limitations of numerical solution of transport equations. Model interpretation and ethics. Offered in alternate years.—(S.) Fogg

#### 273. Introduction to Geostatistics (3)

Lecture—3 hours. Prerequisite: Statistics 130A and 130B, or the equivalent. Statistical treatment of spatial data with emphasis on hydrologic problems. Topics include theory of random functions, variogram analysis, Kriging, co-Kriging, indicator geostatistics, and stochastic simulation of spatial variability. Demonstration and use of interactive geostatistical software included. Offered in alternate years.—F. Fogg

#### 274. Practice of Groundwater Flow and Transport Modeling (3)

Lecture—2 hours; lecture/laboratory—0.5 hours; lecture/discussion—0.5 hours. Prerequisite: course 269, Civil and Environmental Engineering 272B, or Civil and Environmental Engineering 272C. Selecting and building groundwater flow and transport models. Planning, preparation, execution, presentation, and review of modeling projects. Review of methods, assumptions, and limitations of groundwater models; practicing with MODFLOW, MT3D, associated GUI, and with other groundwater modeling software of choice. Offered in alternate years.—(S.) Harter

#### 275. Analysis of Spatial Processes (3)

Lecture—3 hours. Prerequisite: Statistics 102 or the equivalent; course 273 or Statistics 273A recommended. Characterization of homogeneous random fields; extremes and spectral parameters; geometry of excursions, local averaging; scale of fluctuation; non-Gaussian and irregular random fields; geostatistical applications.

#### 286. Selected Topics in Environmental Remote Sensing (3)

Discussion—2 hours; lecture—1 hour; project. Prerequisite: consent of instructor; Environmental and Resource Sciences 186 or equivalent required; Environmental and Resource Sciences 186L recommended. In depth investigation of advanced topics in remote sensing applications, measurements, and theory. (Same course as Geography 286) May be repeated for credit. Offered irregularly.—S. (S.) Ustin

#### 290. Seminar in Hydrologic Science (1)

Seminar—1 hour. Prerequisite: graduate standing and background in Hydrologic Science, consent of instructor. Seminars and critical review of problems, issues, and research in hydrologic sciences. Oral presentations of research. Topics will vary. May be repeated for credit. (S/U grading only.)—S. (S.)

#### 298. Group Study (1-5)

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)—F, W, S. (F, W, S.)

#### 299. Research (1-12)

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)—F, W, S. (F, W, S.)

**Professional****396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**Professional****410. OSHA HAZWOPER Refresher Course (1)**

Lecture—1 hour. Updates hazardous materials handling information for purposes of keeping certification current. Certification lapses until the refresher course is complete. (P/NP grading only.)

**440. Hazardous Waste Operations Training (3)**

Lecture—2 hours; laboratory—2 hours. Prerequisite: upper division standing in College of Agricultural and Environmental Sciences. Forty-hour course designed to meet the requirements of Federal OSHA regulation CFR 1910.120. Covers the health, regulatory, processing and safe handling issues/problems associated with working with hazardous materials. (P/NP grading only.)

## Hydrology

(College of Agricultural and Environmental Sciences)

**Faculty.** See under Department of [Land, Air and Water Resources](#), on page 391, Hydrology Section.

**The Major Program**

Hydrology is the study of the occurrence, distribution, circulation, and behavior of water and water-borne materials in the environment of Earth. It includes practical measurement and technical analysis of water phenomena underground, on the Earth's surface, and in the atmosphere. Contemporary hydrologic problems costing society \$10-100 billion per year include environmental restoration, sustainability of groundwater and surface water resources, water pollution, and natural disasters such as floods, droughts, landslides, avalanches, and land subsidence. The management of these problems demands hydrologic scientists with the comprehensive, interdisciplinary education embodied in this program. Beyond its societal utility, hydrology can be an exciting science for the curious-minded. Hydrologists explore natural phenomena such as climate change, waterfalls, health of coral reefs, biogeochemical cycles, and aquifers.

**The Program.** A hydrologist needs a strong background across the basic sciences of physics, mathematics, chemistry, and biology. Breadth of understanding comes from exposure to ecology, geology, engineering, policy, and law. Depth of experience is provided by core hydrology courses, internship opportunities, and practical outdoor training. Students choose electives to match their interests and career goals. Transfer students should have completed as much as possible of the preparatory subject matter listed below.

**Internships and Career Alternatives.** Job opportunities in hydrology exceed the available supply of trained hydrologists. Students commonly obtain internships and jobs with state and federal agencies, private consulting firms, environmental interest groups, irrigation districts, and utility companies. Federal agencies hiring hydrologists include the U.S. Geological Survey, U.S. Department of Agriculture (Fish and Wildlife, Agricultural Research, Forest Service, and National Resource Conservation Service), Environmental Protection Agency, and national research laboratories (Lawrence Livermore National Laboratory, Oak Ridge National Laboratory). State and local agency employers include California's Departments of Water Resources, Conservation, Fish and Game, and Toxic Substances as well as the Water Resources Control Board and Regional Water Quality Control Boards. To obtain higher levels of responsibility and salary, hydrologists often seek advanced degrees, and the hydro-

logy major is designed to provide students with a highly competitive education to get into graduate school.

**B.S. Major Requirements:**

UNITS

**Preparatory Subject Matter.....71**

Biological Sciences 2A, 2B.....	10
Chemistry 2A, 2B, 2C .....	15
Physics 9A, 9B, 9C .....	15
Mathematics 21A, 21B, 21C, 21D, 22A, 22B.....	22
Geology 50, 50L .....	5
Engineering 6 or the equivalent.....	4

**Depth Subject Matter .....46-55**

Hydrologic Science 103N or Engineering 103 or equivalent .....	4
Civil and Environmental Engineering 114 or Statistics 130A and 130B .....	4-6
Hydrologic Science 134, 141, 142, 144, 151 .....	21
Soil Science 107 .....	5
Select one of Hydrologic Science 150, Agricultural and Resource Economics 147, Environmental Science and Policy 161, 166N .....	3-4
Select three of Hydrologic Science 110, 124, 143, 146; Civil and Environmental Engineering 141; Applied Biological Systems Technology 165 .....	9-13

**Restricted Electives.....16-26**

To supplement or expand areas of student interest selected with approval of adviser

**Total Units for the Major .....129-148**

**Major Adviser.** Helen Dahlke ([Land, Air and Water Resources](#))

**Advising Center.** 1150 PES Building Staff Adviser  
Lacole Brooks [lbrouks@ucdavis.edu](mailto:lbrouks@ucdavis.edu)

**Minor Program Requirements:****Hydrology**

The Hydrology Section of the Department of Land, Air and Water Resources offers the minor in Hydrology for environmental or natural science students who have an interest in water/environmental issues. The interested student should have completed preparatory course work in calculus (Mathematics 16B), chemistry (Chemistry 2A; Chemistry 2B recommended), physics (Physics 7A), and biology (Biological Sciences 2A). Course work in the minor provides fundamental skills and knowledge of the hydrologic sciences. The program is sufficiently flexible for students to pursue particular water issues or problems of interest to them.

UNITS

**Hydrology.....20-23**

Hydrologic Science 103N or Engineering 103 .....	4
Hydrologic Science 141 or Environmental Science and Management 100.....	4
Hydrologic Science 144 .....	4
Soil Science 107 .....	5
Hydrologic Science 134, Chemistry 100, Soil Science 111, or Environmental Science and Policy 151 .....	3-6

**Watershed Science**

The Hydrology Program of the Department of Land, Air and Water Resources offers the minor in Watershed Science. This minor is intended for environmental, natural, or social science students who have an interest in the interfaces between hydrology, ecology, policy and management. The interested student should have completed preparatory course work in calculus (Mathematics 16B), chemistry (Chemistry 2A; Chemistry 2B recommended), physics (Physics 7A), and biology (Biological Sciences 2A). Course work in the minor provides fundamental skills and knowledge on science and management of watersheds in the context of current water resources and ecological problems.

**Minor Program Requirements:**

UNITS

**Watershed Science .....21-26**

Hydrologic Science 141 or Environmental Science and Management 100 .....	4
Soil Science 100 or 118 .....	4-5
Hydrologic Science 144 or Soil Science 107 .....	4-5
Hydrologic Science 124, or Hydrologic Science 151 .....	4
Hydrologic Science 143, Environmental Science and Management 144, or Environmental Science and Policy 151 .....	3-4
Hydrologic Science 150, Environmental Science and Management 121, or Environmental Science and Policy 161 .....	3-4

**Minor Adviser.** Graham Fogg 530-752-6810;  
[gffogg@ucdavis.edu](mailto:gffogg@ucdavis.edu).

**Courses in Hydrologic Science (HYD)**

Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center in 113 Veihmeyer Hall or in 1150 Plant and Environmental Sciences Building 530-752-1603.

**Lower Division****10. Water, Power, Society (3)**

Lecture—2 hours; discussion—1 hour. Water resources issues. How water has been used to gain and wield socio-political power. Water resources development in California as related to current and future sustainability of water quantity and quality. Roles of science and policy in solving water problems. (Same course as Science and Society 10.) GE credit: SciEng or SocSci, Wrt | SE or SS, SL.—S. (S.) Fogg

**47. Watershed Processes and Water Quality in the Tahoe Basin (2)**

Lecture/laboratory—21 hours; fieldwork—9 hours; discussion—3 hours; term paper. Prerequisite: basic knowledge of environmental, soil, or hydrologic sciences. Watershed processes, runoff water-quality management, restoration in Lake Tahoe Basin. Soils, precipitation-runoff, revegetation and adaptive management related to erosion control, effective solutions, development of restoration strategies. Students develop field restoration. Course involves 3 days of instruction in Tahoe City. (Same course as Environmental Science and Management 47.) Not open to students who have successfully completed Environmental and Resource Sciences 47. (Formerly Environmental and Resource Sciences 47.) GE credit: SciEng | QL, SE, SL.—Su. (Su.) Grismer

**92. Hydrologic Science Internship (1-12)**

Internship—3-36 hours. Prerequisite: lower division student, consent of instructor. Work experience off and on campus in Hydrologic Science. Internship supervised by a member of the faculty. (P/NP grading only.)—F, W, S. (F, W, S.)

**98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. Offered irregularly. (P/NP grading only.)

**Upper Division****103N. Fluid Mechanics Fundamentals (4)**

Lecture—4 hours. Prerequisite: Physics 9B. Fluid mechanics axioms, fluid statics, kinematics, velocity fields for one-dimensional incompressible flow and boundary layers, turbulent flow time averaging, potential flow, dimensional analysis, and macroscopic balances to solve a range of practical problems. (Same course as Biological Systems Engineering 103.) Offered irregularly. GE credit: SciEng | QL, SE, SL.—F. (F.)

**110. Irrigation Principles and Practices (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Physics 7A; Soil Science 100 recommended. General course for agricultural and engineering students

dealing with soil and plant aspects of irrigation and drainage. Soil-water principles including water movement, plant responses to irrigation regimes, water use by crops; also irrigation systems and water quality. Not open for credit to students who have completed Water Science 110. Offered in alternate years. GE credit: SciEng | SE, SL.—(S.) Goldhamer, Grattan

#### **124. Plant-Water-Soil Relationships (4)**

Lecture—3 hours; discussion—1 hours. Prerequisite: one upper division course in soil science, such as Soil Science 100; and one upper division course in plant science or plant biology, such as Plant Biology 111; or consent of instructor. Principles of plant interactions with soil and atmospheric water environments and practical applications to crop management (e.g., irrigation) and plant eco-physiology (e.g., drought). Not open for credit to students who have completed Water Science 104. GE credit: SciEng | QL, SE, SL.—S. (S.) Shackle

#### **134. Aqueous Geochemistry (6)**

Lecture—4 hours; laboratory—3 hours. Prerequisite: Chemistry 2B. Chemistry of natural waters; dielectric properties of water; thermodynamic and mass-action relations; metal hydrolysis; acid-base equilibria; metalcoordination chemistry; solubility calculations; electron-exchange reactions; sorptive partitioning; ion exchange; and dissolved organic matter. GE credit: SciEng | QL, SE.—S. (S.) Hernes, Parikh

#### **141. Physical Hydrology (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Physics 9B, Mathematics 21B; course 100 recommended. Introduction to the processes that constitute the hydrologic cycle. Special emphasis on a quantitative description of the following processes: precipitation, infiltration, evaporation, transpiration, surface runoff, and groundwater runoff. GE credit: SciEng | QL, SE, SL, VL.—F. (F.) Puente

#### **142. Systems Hydrology (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 141 or Civil and Environmental Engineering 142. General course considering hydrologic processes from a systems or statistical model perspective. General probability concepts are applied to frequency, time series and spatial data analysis. Linear systems are also considered in conjunction with Kalman filter techniques. GE credit: SciEng | OL, QL, SE.—W. (W.) Puente

#### **143. Hydrological Processes in Ecosystems (3)**

Lecture—3 hours. Prerequisite: course 141 or Environmental and Resource Science 100. Movement and storage of water are integral parts of landscape and ecosystem functioning. Hydrological processes in individual ecosystems and the role of water linking the myriad components of the landscape. Offered in alternate years. GE credit: SciEng | QL, SE, SL.—(W.) Pasternack

#### **144. Groundwater Hydrology (4)**

Lecture—4 hours. Prerequisite: Mathematics 16B or 21A; course 103 or Engineering 103 recommended. Fundamentals of groundwater flow and contaminant hydrology. Occurrence, distribution, and movement of groundwater. Well-flow systems. Aquifer tests. Well construction operation and maintenance. Groundwater exploration and quality assessment. Agricultural threats to groundwater quality: fertilizers, pesticides, and salts. (Same course as Hydrologic Science 144.) Offered alternate years. GE credit: SciEng | QL, SE, SL, VL.—F. (F.) Harter

#### **146. Hydrogeology and Contaminant Transport (5)**

Lecture—3 hours; laboratory—2 hours; term paper. Prerequisite: course 144 or Civil and Environmental Engineering 144 or the equivalent. Physical and chemical processes affecting groundwater flow and contaminant transport, with emphasis on realistic hydrogeologic examples. Groundwater geology and chemistry. Fundamentals of groundwater flow and transport analysis. Laboratory includes field pumping test and work with physical and computer models. (Same course as Geology 156.) GE credit: SciEng | SE.—W. (W.) Fogg

#### **147. Runoff, Erosion and Water Quality Management in the Tahoe Basin (3)**

Lecture/laboratory—30 hours; fieldwork—15 hours; discussion—10 hours; term paper. Prerequisite: Physics 7B or 9B, Mathematics 16C or 21C, Civil and Environmental Engineering 142 or course 141 or Environmental and Resource Sciences 100. Practical hydrology and runoff water quality management from Tahoe Basin slopes. Development of hillslope and riparian restoration concepts, modeling and applications from physical science perspectives including precipitation-runoff relationships, sediment transport, and detention ponds. Five days of instruction in Tahoe City. (Same course as Biological Systems Engineering 147.) GE credit: SciEng | QL, SE, SL.—Su. (Su.) Grismer

#### **150. Water Law (3)**

Lecture—3 hours. Prerequisite: consent of instructor or upper division standing. Principles and issues of California Water Law. Types of water rights, groundwater rights and management, and protection of instream uses. Water projects, role of federal government and federal/state relations. Basic water quality acts, endangered species act, water transfers and current water issues. GE credit: SocSci | ACGH, SS.—W. (W.) Cahill

#### **151. Field Methods in Hydrology (4)**

Lecture—2 hours; laboratory—3 hours; fieldwork—3 hours. Prerequisite: Environmental and Resource Sciences 100 or course 141. Measurement methods and data analysis for evaluation of water storage, movement and contamination in the field. Equipment such as data loggers, water and sediment samplers, pressure transducers, weather stations, surveying equipment, and flow meters will be used. Offered in alternate years. GE credit: SciEng | QL, SE, SL.—W. Pasternack

#### **182. Environmental Analysis using GIS (4)**

Lecture—2 hours; laboratory—4 hours. Prerequisite: Applied Biological Systems Technology 180 or the equivalent GIS experience and skills; general biology and/or ecology courses recommended. Ecosystem and landscape modeling with emphasis on hydrology and solute transport. Spatial analysis of environmental risk analysis including ecological risk assessment, natural resource management. Spatial database structures, scripting, data models, and error analysis in GIS. Offered in alternate years. (Same course as Applied Biological Systems Technology 182.) GE credit: SciEng | QL, SE, SL, VL.—W. (W.) Hijmans

#### **192. Hydrologic Science Internship (1-12)**

Internship—3-40 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in water science. Internship supervised by a member of the faculty. (P/NP grading only.)—F, W, S. (F, W, S.)

#### **198. Directed Group Study (1-5)**

(P/NP grading only.)—F, W, S. (F, W, S.)

#### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: senior standing. (P/NP grading only.)—F, W, S. (F, W, S.)

## **Immunology (A Graduate Group)**

Charles Bevins, M.D., Ph.D., Chairperson of the Group

**Group Office.** 5217 Vet Med 3A;  
530-754-0103;  
<http://immunology.compmed.ucdavis.edu/>

#### **Faculty**

Iannis Adamopoulos, Ph.D., Assistant Professor (Rheumatology, Allergy and Clinical Immunology)

Paul Ashwood, Ph.D., Associate Professor (Microbiology, and Immunology)

Stephen Barthold, D.V.M, Ph.D., Professor (Center for Comparative Medicine and Pathology, Microbiology and Immunology)

Nicole Baumgarth, D.V.M., Ph.D., Professor (Center for Comparative Medicine and Pathology, Microbiology and Immunology)

Andreas Baumler, Ph.D., Professor (Microbiology, and Immunology)

Charles Bevins, M.D., Ph.D., Professor (Microbiology, and Immunology)

Christopher L. Bowlus, M.D., Associate Professor (Gastroenterology)

Kiho Cho, Ph.D., Associate Adjunct Professor (Surgery)

Sean Collins, Ph.D., Associate Professor (Microbiology and Molecular Genetics)

Lillian Cruz-Orengo, Ph.D., Assistant Professor (Anatomy, physiology & Cell Biology)

Satya Dandekar, Ph.D., Professor and Chair (Microbiology, and Immunology)

Melanie Gareau, Ph.D., Assistant Professor (Anatomy, Physiology & Cell Biology)

Laurel J. Gershwin, D.V.M., Ph.D., Professor (Pathology, Microbiology, and Immunology)

Tzipora Goldkorn, Ph.D., Professor (Pulmonary and Critical Care Medicine)

Leigh G. Griffiths, Vet.MB, MRCVS, Ph.D., Associate Professor (Veterinary Medicine and Epidemiology)

Angela Haczku, M.D., Ph.D., Professor (Pulmonary and Critical Care Medicine)

Richard W. Harper, M.D., Ph.D., Associate Professor (Pulmonary and Critical Care Medicine)

Volkmar Heinrich, Ph.D., Associate Professor (Biomedical Engineering)

Daniel Hwang, Ph.D., Adjunct Professor (Nutrition)

Kirk C. Klasing, Ph.D., Professor (Animal Science)

Kit S. Lam, M.D., Ph.D., Professor and Chief (Hematology and Oncology)

Pam Lein, Ph.D., Professor (Molecular Biosciences)

Patrick S.C. Leung, Associate Adjunct Professor (Rheumatology, Allergy and Clinical Immunology)

Jamal S. Lewis, Ph.D., Assistant Professor (Biomedical Engineering)

Shirley Luckhart, Ph.D., Professor (Microbiology, and Immunology)

Emanual Maverakis, M.D., Assistant Professor (Dermatology)

Kim McAllister, Ph.D., Professor (Neurology & Neurobiology, Physiology, and Behavior)

Stephen J. McCorley, Ph.D., Associate Professor (Center for Comparative Medicine and Anatomy Physiology and Cell Biology)

Lisa A. Miller, Ph.D., Associate Professor (Anatomy, Physiology and Cell Biology)

William J. Murphy, Ph.D., Professor (Dermatology)

Lorena Navarro, Ph.D., Assistant Professor (Microbiology and Molecular Genetics)

Robert T. O'Donnell, M.D., Ph.D., Professor (Hematology and Oncology)

John Peters, Ph.D., Associate Professor-in-Residence (Internal Medicine)

Kent E. Pinkerton, Ph.D., Professor and Director (Anatomy, Physiology and Cell Biology) Distinguished Teaching Award-Graduate/Professional

David Pleasure, M.D., Ph.D., Professor (Neurology and Pediatrics)

Katherine S. Ralston, Ph.D., Assistant Professor (Microbiology and Molecular Genetics)

Siba Raychaudhuri, M.D., Clinical Assistant Professor and Chief Rheumatologist (Sacramento VA Medical Center)

Colin Reardon, Ph.D., Assistant Professor (Anatomy, Physiology and Cell Biology)

Grace L. Rosenquist, Ph.D., Assistant Adjunct Professor (Neurobiology, Physiology, and Behavior)

Jeroen Saeij, Ph.D., Associate Professor (Pathology, Microbiology and Immunology)

Barbara Shacklett, Ph.D., Associate Professor (Microbiology, and Immunology)

Scott I. Simon, Ph.D., Professor (Biomedical Engineering)

Jay Solnick, M.D., Ph.D., Professor (Center for Comparative Medicine and Medical Microbiology and Immunology)

Ellen E. Sparger, D.V.M., Ph.D., Associate Adjunct Professor (Medicine and Epidemiology)

Athena Soulika, Ph.D., Assistant Professor  
(*Dermatology*)  
Charles B. Stephensen, Ph.D., Adjunct Professor  
(*Western Human Nutrition Research Center*)  
Jeffrey L. Stott, Ph.D., Professor  
(*Pathology, Microbiology, and Immunology*)  
Yoshikazu S. Takada, M.D., Ph.D., Professor  
(*Dermatology*)  
Suzanne S. Teuber, M.D., Professor  
(*Rheumatology, Allergy and Clinical Immunology*)  
Jose V. Torres, Ph.D., Professor  
(*Microbiology, and Immunology*)  
Renee M. Tsolis, Ph.D., Associate Professor  
(*Microbiology, and Immunology*)  
Joseph M. Tuscano, M.D., Professor  
(*Hematology and Oncology*)  
Judy Van de Water, Ph.D., Professor-in-Residence  
(*Rheumatology, Allergy and Clinical Immunology*)  
Andrew Vaughan, Ph.D., Professor  
(*Radiation Oncology*)  
Robert H. Weiss, M.D., Associate Professor  
(*Nephrology*)  
Reen Wu, Ph.D., Professor  
(*Anatomy, Physiology and Cell Biology*)  
Heike Wulff, Ph.D., Associate Professor  
(*Pharmacology*)  
Susan Zunino, Ph.D., Associate Adjunct Professor  
(*Nutrition*)  
Huaijun Zhou, Ph.D., Assistant Professor  
(*Animal Science*)

**Graduate Study.** The Graduate Group in Immunology offers an interdisciplinary program of study in an exciting field of biology and medicine leading to the M.S. and Ph.D. degrees. Participating faculty from various Schools and Departments at UC Davis provide research opportunities in diverse areas of applied immunology. Areas of focus include infection and immunity (including host response regulation to parasites, viruses and bacteria), nutrition and immunity, autoimmunity, immune regulation, neuroimmunology, cancer therapy and immune mediators and their uses for diagnosis and treatment.

**Preparation.** Applicants for candidacy to these programs should have completed undergraduate preparation in mathematics, physics, chemistry, biochemistry, molecular and cellular biology or related biological and medical sciences.

For work leading to the Ph.D. degree, the requirements include cell biology, chemical immunology, cellular immunology, immunohematology, and advanced immunology. In addition to these general requirements, more specialized preparation in at least one of the following is required: (*a*) microbiological specialties (bacteriology, virology, parasitology, medical microbiology); (*b*) zoological specialties (cell biology, endocrinology, embryology, proto-zoology, histology, cytology, physiology); (*c*) medical specialties (pathology, anatomy, pharmacology, clinical pathology, reproduction, hematology, epidemiology); (*d*) biochemistry/biophysics specialties (biologically active molecules, control mechanisms); (*e*) genetic specialties (developmental genetics, population genetics, cytogenetics, molecular genetics).

**Graduate Adviser.** See the graduate program website at <http://immunology.compmed.ucdavis.edu/people/>.

### Courses in Immunology (IMM)

Additional courses are available and listed under the individual sponsoring departments. Contact the Group office for information.

### Graduate

#### 201. Introductory Immunology (4)

Lecture—4 hours. Prerequisite: graduate standing. Enrollment limited to 30 students. Comprehensive introduction to the principles of immunology.—F. (F.) Miller

#### 201L Advanced Immunology Laboratory Rotations (4)

Laboratory/discussion—12 hours. Laboratory assignment in two research laboratories. Individual research problems with emphasis on methodologi-

cal/procedural experience and experimental design. Student writes a project outline and gives oral presentation. May be repeated two times for credit. (S/U grading only).—F. (F.) McSorley

#### 202L Advanced Immunology Laboratory Rotations (5)

Laboratory/discussion—15 hours. Laboratory assignment in two research laboratories. One four-week and one six week assignment in immunology research laboratories. Individual research problems with an emphasis on methodological/procedural experience and experimental design. May be repeated two times for credit. (S/U grading only).—W. (W.) McSorley

#### 203. Cancer Immunology (2)

Lecture—1 hour; term paper. Covers concepts in cancer biology, progression and immune evasion. It will also cover topics such as: immune surveillance, immune effector mechanisms and current concepts in immune therapy. Offered in alternate years.—S. Murphy

#### 204. Topics in Innate Immunity (2)

Extensive writing or discussion—1 hour; performance instruction—1 hour. Prerequisite: course 201 or equivalent; course 293 preferred. Restricted to first- or second-year GGI and MGG students; others with permission of instructor; enrollment limited to 18 students. Covers current topics in the field of innate immunity through student seminar presentations and critical evaluation of the literature. Concepts include: pathogen recognition, intercellular communication, specialized cellular function and effector/signaling molecules. Offered in alternate years.—Su. Bevins

#### 210. Topics on Neuroimmunology and Neuroinflammation (1)

Seminar—1 hours. Prerequisite: consent of instructor. Topics will include a broad range of frontiers in neuroimmunology and neuroinflammation. Research articles in current literature will serve to guide in-depth discussions of experimental approaches, technical aspects of experimental techniques, data interpretation, and other relevant aspects of each topic. (S/U grading only).—F. (F.) Soulaki

#### 292. Immunotoxicology Seminar (2)

Seminar—2 hours. Prerequisite: graduate standing in Pharmacology/Toxicology, Immunology, Physiology, or Biochemistry. Seminar presentations dealing with principles of xenobiotic effects on immune system functions and specific examples of drugs and environmental chemicals exerting toxic effects on the immune system. (S/U grading only.)

#### 293. Current Concepts in Immunology (4)

Lecture/discussion—4 hours. Prerequisite: Pathology, Microbiology, and Immunology 126 or consent of instructor. Innate and acquired immunity as defense mechanisms against disease. Mechanisms regulating the distinct cell types driving these responses and current concepts in the literature.—W. (W.) Baumgarth

#### 294. Comparative Clinical Immunology (4)

Lecture/discussion—4 hours. Prerequisite: Pathology, Microbiology, and Immunology 126 or consent of instructor. Clinical immunology in animals and man. Pathogenesis of representative infectious diseases, hypersensitivity reactions, and autoimmunity. Emphasis on specific and nonspecific immune effector mechanisms to combat infections or mediate pathology. Not open for credit to students who have completed course 294A. Offered in alternate years.—Gershwin

#### 295. Cytokines (3)

Lecture—2 hours; discussion—1 hour. Prerequisite: course 293 or consent of instructor. Cytokines and their involvement in human and animal physiology/disease, molecular mechanisms and receptor signaling. Immune and non-immune actions. Overlapping/redundant functions (referred to as the "cytokine network").

#### 296. Advanced Topics in Immunology (2)

Seminar—2 hours. Prerequisite: graduate standing or consent of instructor. Presentation, discussion, and analysis of faculty research topics in immunology.

Required for Immunology Graduate Students every year until they have passed their qualifying exam. May be repeated for credit. (S/U grading only).—F. (F.) Maverakis

#### 297. Mucosal Immunology (2)

Lecture—1 hour; discussion—1 hour; term paper. Prerequisite: course 201 or equivalent. Basic concepts and current research topics in the field of mucosal immunology, with an emphasis on human immunology. Major emphases include innate and adaptive mucosal immunity, the gastrointestinal tract, the lung, lymphocyte trafficking, and mucosal vaccination. Offered in alternate years.—(W.) Shacklett

## Independent Study Program

**Information.** Chairperson, Committee on Courses of Instruction, c/o Academic Senate Office 530-752-2231

The Independent Study Program provides an opportunity for upper division students to design and pursue a full quarter (12-15 units) of individual study in an area of special interest.

A program qualifying as Independent Study will consist of one or more courses in the 190–199 series. While the theme of such a program may be reasonably broad, a recognizable common thread should unite all the academic work you undertake during an independent study quarter. Regularly offered formal courses will only be acceptable as a part of such a program if they clearly fit its theme and contribute something essential toward the realization of its objectives. The program is not to be considered a way to take more variable-unit courses than normally permitted.

The procedure for enrolling in an Independent Study Program is as follows:

- (1) Develop, in general terms, a plan of study;
- (2) Locate a faculty sponsor or panel of sponsors and with their help and approval develop a detailed plan;
- (3) Complete a project proposal form (obtained from the Academic Senate office) and submit it to the Academic Senate Committee on Courses of Instruction.

The deadline for applications is the tenth day of instruction of the term before; see the [Academic Calendar, on page 1](#), for specific dates.

You must report the completion or termination of the project to the Committee on Courses of Instruction.

## Individual Major

(College of Agricultural and Environmental Sciences, College of Biological Sciences, and College of Letters and Science)

### The Major Program

The Individual Major, an integrated program composed of courses from two or more disciplines, is designed by the student and is subject to approval by faculty advisers and appropriate college committees. This major enables a student to pursue a specific interest that cannot be accommodated within the framework of an existing major. It must clearly and specifically meet the student's educational goals as well as meet university and college academic standards.

### College of Agricultural and Environmental Sciences

The Individual Major in this College has been suspended indefinitely.

#### Program Office.

150 Mrak Hall

530-752-0108

<http://www.caes.ucdavis.edu/students/current/advising>

**Student Proposal.** An Individual Major may be organized by a student having a specific academic interest not represented by an established major. Each student wishing an Individual Major should submit a proposal to the Dean's Office, prior to reaching 120 units, for review by the Student Actions and Individual Major Subcommittee. This proposal must include (1) an essay describing the special educational aims of the student, including a statement indicating why the educational objectives cannot be met by existing majors; (2) a list of planned courses; and (3) faculty adviser recommendations. It is critical that students contact a college counselor in the Dean's Office for consultation and development of the proposal.

UNITS

**Preparatory Subject Matter.....(variable)**

Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements.

**Depth Subject Matter .....45-54**

Upper division course work must include:

- (a) Interrelated courses of 45 upper division units from two or more areas of study;
- (b) At least one of the two or more areas of study must be within the College of Agricultural and Environmental Sciences;
- (c) At least 30 of the 45 upper division units that are required in the program must be taken from courses provided by the College of Agricultural and Environmental Sciences.

**Unrestricted Electives .....(variable)****Total Units for the Major .....45-54**

**Master Adviser.** Thomas Gordon, Ph.D. (*Plant Pathology*)

**College of Biological Sciences**

**Program Office.** Biology Academic Success Center; 1023 Sciences Laboratory Building; 530-752-0410

**Student Proposal.** A student who wishes to propose an individual major must submit the proposal to the Committee on Undergraduate Student Petitions prior to reaching 120 units. It is important for the student to make arrangements to speak with an adviser in the Biology Academic Success Center early in the development of his/her major as no individual major will be approved after a student has completed 120 units.

**A.B. and B.S. Major Requirements:**

UNITS

**Preparatory Subject Matter.....(variable)**

Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements as determined by the Committee on Undergraduate Student Petitions.

**Depth Subject Matter .... 45 units minimum**

Upper division course work must include:

- (a) at least 30 units from courses offered by departments in the College of Biological Sciences;
- (b) additional requirements as determined by the Committee on Undergraduate Student Petitions. See the Biology Academic Success Center for details.
- (c) for the B.A. degree, a maximum of 80 units toward the major; for the B.S. degree, a maximum of 110 units toward the major.

**All University, General Education, and College of Biological Sciences Bachelor's degree requirements .....(variable)****Total Units for the Degree .....180****Principal Adviser (selected by student).**

A faculty member in a department or program in the College of Biological Sciences.

**College of Letters and Science**

**Program Office.** 200 Social Sciences and Humanities Building (Undergraduate Education and Advising office); <http://www.ls.ucdavis.edu/students>

**Committee in Charge**

John Teming, Ph.D., Chairperson (*Physics*)

Adewale Adebanwi, Ph.D.

(*African American and African Studies*)

Prabir Burman, Ph.D. (*Statistics*)

Diana Davis, Ph.D. (*History*)

Sara Perrault, Ph.D. (*University Writing Program*)

**Student Proposal.** A student who wishes to propose an individual major must submit the proposal to the Faculty Committee on Individual Majors in the College of Letters and Science prior to reaching 120 units. The proposal must be submitted by the end of the fourth week of the quarter. This proposal will consist of (1) an essay, identifying the specific educational and professional objectives, including an indication of why the objectives cannot be met within existing majors, (2) a list of courses planned to complete the major, and (3) faculty adviser recommendations. The proposal will be reviewed and a decision provided the quarter of submittal. It is important that you carefully review the information in the Individual Majors Handbook; available at <http://ls.ucdavis.edu/advising/academic-pdfs/individual-major-handbook.pdf>.

**A.B. and B.S. Major Requirements:**

UNITS

**Preparatory Subject Matter.....(variable)**

Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements.

**Depth Subject Matter .....45-54**

Upper division units must include:

- (a) interrelated and complementary courses from two or more departments which provide a unified pattern and focus;
- (b) at least 30 units from Letters and Science teaching departments or programs;
- (c) no more than 10 units in courses numbered 194H, 198 and 199;
- (d) for the A.B. degree, a maximum of 80 units toward the major; for the B.S. degree, a maximum of 110 units toward the major.

**Total Units for Degree .....180**

**Major Advisers (selected by student).** Principal Adviser: a faculty member in a teaching department or program in the College of Letters and Science in the major field of emphasis. Secondary Adviser: a faculty member from a secondary area of interest.

**Honors Program.** By the fourth week of the last quarter of the junior year, students potentially eligible for high or highest honors at graduation (see College section), may petition the Individual Majors Committee for tentative acceptance into an honors program.

Final admission will depend upon the Committee's approval of a senior thesis prospectus that has been agreed upon by the student and faculty adviser. The prospectus must be presented to the Committee by the end of the fourth full week of instruction of the first quarter of the senior year. Graduation with high or highest honors will be conditional upon both the maintenance of the required grade point average and the satisfactory completion of the senior thesis project. Students who anticipate doing a senior honors thesis should allow up to three units of independent study in the program during each of two quarters in the senior year as course options.

**Integrative Genetics and Genomics (A Graduate Group)**

Formerly Genetics

Fred Chedin, Ph.D., Chairperson of the Group

**Group Office.** 227A Life Sciences

530-752-4863;

<http://igg.ucdavis.edu/>

**Faculty**

Sharon Aviran, Ph.D., Assistant Professor (*Biomedical Engineering*)

Danika Bannasch, Ph.D., Professor

(*VM: Population Health and Reproduction*)

Jacqueline Barlow, Ph.D., Professor

(*Microbiology and Molecular Genetics*)

Diane Beckles, Ph.D., Associate Professor (*Plant Sciences*)

David Begun, Ph.D., Professor

(*Evolution and Ecology*)

Rebecca Bellone, Ph.D., Associate Adjunct Professor

(*VM: Population Health and Reproduction*)

Craig Benham, Ph.D., Professor

(*Biomedical Engineering*)

Alan B. Bennett, Ph.D., Professor (*Plant Sciences*)

Linda F. Bisson, Ph.D., Professor

(*Viticulture and Enology*)

Simeon Boyd, Ph.D., Associate Professor (*Pediatrics Medicine*)

Siobhan M. Brady, Ph.D., Associate Professor (*Plant Biology*)

Anne B. Britt, Ph.D., Professor (*Plant Biology*)

Nadene Brown, Ph.D., Associate Professor (*Cell Biology and Human Anatomy*)

Sean Burgess, Ph.D., Professor

(*Molecular and Cellular Biology*)

Judy Callis, Ph.D., Professor

(*Molecular and Cellular Biology*) Academic Senate Distinguished Teaching Award

Dario Cantu, Ph.D., Assistant Professor

(*Viticulture and Enology*)

Luis G Carvajal-Carmona, Ph.D., Assistant Professor (*Biochemistry and Molecular Medicine*)

Frederic Chedin, Ph.D., Professor

(*Molecular and Cellular Biology*)

Hongwu Chen, Ph.D., Professor

(*Biochemistry and Molecular Medicine*)

Roger Chetelat, Ph.D., Agronomist

(*Plant Sciences*)

Joanna Chiu, Ph.D., Assistant Professor (*Entomology*)

Luca Comai, Ph.D., Professor (*Plant Biology*)

Douglas Cook, Ph.D., Professor (*Plant Pathology*)

Gino A. Cortopassi, Ph.D., Professor

(*Molecular Biosciences*)

Michael E. Dahmus, Ph.D., Professor Emeritus (*Molecular and Cellular Biology*)

Abhay Dandekar, Ph.D., Professor (*Plant Sciences*)

Saty Dandekar, Ph.D., Professor

(*Microbiology—Medicine*)

Mary Delany, Ph.D., Professor (*Animal Science*)

Megan Dennis, Ph.D., Assistant Professor

(*Biochemistry and Molecular Medicine*)

Bruce Draper, Ph.D., Associate Professor

(*Molecular and Cellular Biology*)

Jorge Dubcovsky, Ph.D., Professor (*Plant Sciences*)

Jan Dvorak, Ph.D., Professor (*Plant Sciences*)

Jonathan Eisen, Ph.D., Professor (*Evolution and Ecology, Medical Microbiology and Immunology*)

JoAnne Engenbrecht, Ph.D., Professor

(*Molecular and Cellular Biology*)

Thomas R. Famula, Ph.D., Professor

(*Animal Science*)

Nann A. Fangue Ph.D., Assistant Professor

(*Wildlife, Fish and Conservation Biology*)

Carrie Finno, Ph.D., Assistant Professor

Charles S. Gasser, Ph.D., Professor

(*Molecular and Cellular Biology*)

Paul Gepts, Ph.D., Professor (*Plant Sciences*)

Paramita Ghosh, Ph.D., Associate Professor  
(*Urology-Medicine, Biochemistry and Molecular Medicine*)  
Robert L. Gilbertson, Ph.D., Professor  
(*Plant Pathology*)  
David G. Gilchrist, Ph.D., Professor Emeritus  
(*Plant Pathology*)  
Cecilia Giulivi, Ph.D., Professor  
(*VM: Molecular Biosciences*)  
Thomas Glaser, Ph.D., Professor  
(*Cell Biology and Human Anatomy*)  
Thomas Gradiel, Ph.D., Professor (*Plant Sciences*)  
Paul J. Hagerman, Ph.D., Professor  
(*Biochemistry and Molecular Medicine*)  
Nobuko Hagiwara, Ph.D., Associate Professor  
(*Cardiology—Internal Medicine*)  
John H. Harada, Ph.D., Professor (*Plant Biology*)  
Academic Senate Distinguished Teaching Award  
Stacey Harmer, Ph.D., Professor  
(*Plant Biology*)  
Dennis Hartigan-O'Connor, Ph.D., Assistant Professor  
Wolf-Dietrich Heyer, Ph.D., Professor  
(*Microbiology and Molecular Genetics*)  
James Hildreth, Ph.D., Dean  
(*Molecular and Cellular Biology*)  
Fereydoun Hormozdiari, Ph.D., Professor  
(*Biochemistry and Molecular Medicine*)  
Russell Hovey, Ph.D., Professor  
(*Animal Science*)  
Liping Huang, Ph.D., Adjunct Associate Professor  
(*Nutrition*)  
Neil Hunter, Ph.D., Professor (*Microbiology*)  
Li-En Jao, Ph.D., Assistant Professor  
(*Cell Biology and Human Anatomy*)  
Brian Johnson, Ph.D., Assistant Professor  
(*Entomology*)  
Celina Juliano, Ph.D., Assistant Professor  
(*Molecular and Cellular Biology*)  
Sree Kanthaswamy, Ph.D., Professor  
(*Environmental Toxicology*)  
Daniel Kliebenstein, Ph.D., Professor  
(*Population Biology, Plant Sciences*)  
Paul Knoepfle, Ph.D., Associate Professor  
(*Cell Biology and Human Anatomy*)  
Artyom Kopp, Ph.D., Professor  
(*Population Biology, Evolution and Ecology*)  
Ian Korf, Ph.D., Professor  
(*Molecular and Cellular Biology*)  
Stephen C. Kowalczykowski, Ph.D., Distinguished Professor (*Microbiology and Molecular Genetics*)  
Dietmar Kuehlz, Ph.D., Professor (*Animal Science*)  
Michelle La Merrill, Ph.D., Assistant Professor  
(*Environmental Toxicology*)  
Kit Lam, Ph.D., Professor  
(*Hematology and Oncology*)  
Charles Langley, Ph.D., Professor  
(*Population Biology, Evolution and Ecology*)  
Janine LaSalle, Ph.D., Professor  
(*Microbiology—Medicine*)  
F. Thomas Leditz, Ph.D., Affiliate (*Plant Sciences*)  
Su-Ju Lin, Ph.D., Professor  
(*Microbiology and Molecular Genetics*)  
Susan Loft, Ph.D., Assistant Professor  
(*Population Biology, Evolution and Ecology*)  
William Lucas, Ph.D., Distinguished Professor  
(*Plant Biology*)  
Shirley Luckhart, Ph.D., Professor  
(*Microbiology—Medicine*)  
Philip Mack, Ph.D., Associate Adjunct Professor  
(*Hematology and Oncology*)  
Julin Maloof, Ph.D., Professor  
(*Plant Biology*)  
Juan F. Medrano, Ph.D., Professor (*Animal Science*)  
Frederick J. Meyers, Ph.D., Professor  
(*Hematology and Oncology*)  
Richard Michalemore, Ph.D., Professor (*Molecular and Cellular Biology, Plant Sciences*)  
Michael Mienaltowski, Ph.D., Assistant Professor  
(*Animal Science*)  
Michael Miller, Ph.D., Assistant Professor  
(*Animal Science*)  
Maria Mudryj, Ph.D., Professor  
(*Microbiology and Immunology*)  
James D. Murray, Ph.D., Professor (*Animal Science*)

Jeanette E. Natzke, Ph.D., Professor  
(*Molecular and Cellular Biology*)  
David Neale, Ph.D., Professor  
(*Population Biology, Plant Sciences*)  
Jan Nolta, Ph.D., Professor  
(*Hematology and Oncology*)  
Alex Nord, Ph.D., Assistant Professor  
(*Neurobiology, Physiology, and Behavior*)  
Anita M. Oberbauer, Ph.D., Professor  
(*Animal Science*)  
Dan E. Parfitt, Ph.D., Pomologist (*Plant Sciences*)  
Niels Pedersen, Ph.D., D.V.M., Professor  
(*VM: Medicine and Epidemiology*)  
Martin L. Privalsky, Ph.D., Professor  
(*Microbiology and Molecular Genetics*)  
Gerald Quon, Ph.D., Assistant Professor  
(*Molecular and Cellular Biology*)  
Katherine Ralston, Ph.D., Assistant Professor  
(*Microbiology and Molecular Genetics*)  
Bruce Rannala, Ph.D., Professor  
(*Evolution and Ecology, Population Biology*)  
Pamela C. Ronald, Ph.D., Professor (*Plant Pathology*)  
Alan Rose, Ph.D., Project Scientist  
(*Molecular and Cellular Biology*)  
Lesilee Rose, Ph.D., Professor  
(*Molecular and Cellular Biology*)  
Pablo J. Ross, Ph.D., Assistant Professor  
(*Animal Science*)  
Jeffrey Ross-Ibarra, Ph.D., Associate Professor  
(*Population Biology, Plant Sciences*)  
John Roth, Ph.D., Distinguished Professor  
(*Microbiology and Molecular Genetics*)  
Benjamin Sacks, Ph.D., Assistant Adjunct Professor  
(*Population Health and Reproduction*)  
Carl W. Schmid, Ph.D., Professor Emeritus  
(*Molecular and Cellular Biology*)  
Andrea Schreier, Ph.D., Assistant Adjunct Professor  
(*Animal Science*)  
David Segal, Ph.D., Associate Professor  
(*Biochemistry and Molecular Medicine*)  
Michael F. Seldin, Ph.D., Professor  
(*Biochemistry and Molecular Medicine*)  
Barbara L. Shacklett, Ph.D., Professor  
(*Microbiology and Immunology*)  
Frank Sharp, Ph.D., Professor (*Neurology*)  
Justin B. Siegel, Ph.D., Assistant Professor  
(*Biochemistry and Molecular Medicine*)  
Neelima Sinha, Ph.D., Professor  
(*Plant Biology*)  
Dina St. Clair, Ph.D., Professor (*Plant Sciences*)  
Daniel Starr, Ph.D., Professor  
(*Molecular and Cellular Biology*)  
Joshua Stern, Ph.D., Assistant Professor  
(*VM: Medicine and Epidemiology*)  
Venkatesan Sundaresan, Ph.D., Professor  
(*Plant Sciences, Plant Biology*)  
Thomas Tai, Ph.D., Associate in AES (*Plant Sciences*)  
Cheemeng Tai, Ph.D., Assistant Professor  
(*Biomedical Engineering*)  
Flora Tassone, Ph.D., Professor  
(*Biochemistry and Molecular Medicine*)  
Larry R. Teuber, Ph.D., Professor (*Plant Sciences*)  
Maria Torres Penedo, Ph.D., Associate Research Geneticist (*Veterinary Genetics Laboratory*)  
Judith Van De Water, Ph.D., Professor  
(*Rheumatology and Allergy*)  
Alison Van Eenennaam, Ph.D., Cooperative Extension Specialist (*Animal Science*)  
Mariel Vazquez, Ph.D., Professor  
(*Microbiology and Molecular Genetics*)  
M. Andrew Walker, Ph.D., Professor  
(*Viticulture and Enology*)  
Craig H. Warden, Ph.D., Professor  
(*Neurobiology, Physiology and Behavior*)  
Robert H. Weiss, Ph.D., Professor (*Nephrology*)  
Andrew Whitehead, Ph.D., Associate Professor  
(*Population Biology, Environmental Toxicology*)  
Reen Wu, Ph.D., Professor  
(*Pulmonary/Critical Care Med*)  
Lifeng Xu, Ph.D., Assistant Professor  
(*Microbiology and Molecular Genetics*)  
John I. Yoder, Ph.D., Professor (*Plant Sciences*)  
Aiming Yu, Ph.D., Associate Professor  
(*Biochemistry and Molecular Medicine*)

Konstantinos Zarbalis, Ph.D., Assistant Professor  
(*Pathology and Laboratory Medicine*)  
Mark A. Zern, Ph.D., Professor  
(*Internal Med: Transplant*)  
Chengji Zhou, Ph.D., Associate Professor  
(*Biochemistry and Molecular Medicine*)  
Huaijun Zhou, Ph.D., Associate Professor  
(*Animal Science*)

**Graduate Study.** The Graduate Group in Integrative Genetics and Genomics (IGG) offers programs of study and research leading to M.S. and Ph.D. degrees. Students in the IGG graduate program have the opportunity to apply genomic, molecular, computational, and classical genetic approaches to study model organisms, a broad range of native and agricultural species, humans, and companion animals. The group integrates genetic research across campus and unites over 100 faculty members from more than 25 departments spanning the College of Biological Sciences, the College of Letters and Science, the College of Agricultural and Environmental Sciences, the School of Medicine, and the School of Veterinary Medicine. Students experience an unsurpassed breadth of research and instructional opportunities from the most fundamental to applied aspects of genetics. For additional information regarding the program, contact the group coordinator at 530-752-4863.

## Courses in Genetics (GGG)

### Graduate

#### 201A. Advanced Genetic Analysis (5)

Lecture/discussion—5 hours. Prerequisite: Biological Sciences 101, Statistics 100 or the equivalent, graduate standing. Fundamentals of genetic analysis and chromosome structure using model organisms including mutation, transmission, complementation, suppression, and enhancement as well as epigenetic phenomena at the whole organism and molecular levels.—F. (F.)

#### 201B. Genomics (5)

Lecture—3 hours; discussion—2 hours. Prerequisite: course 201A, course 201C or equivalents that provide a basic understanding of genetics and molecular biology. Class limited to 40 students; priority to Genetics Graduate Group students. Prokaryotic and eukaryotic genomes. Experimental strategies and analytical challenges of modern genomics research and the theory and mechanics of data analysis. Structural, functional, and comparative genomics. Related issues in bioinformatics.—W. (W.)

#### 201C. Molecular Genetic Mechanisms in Disease (4)

Lecture/discussion—4 hours. Prerequisite: Biological Sciences 101 or the equivalent. Pass One restricted to graduate students in genetics, microbiology or biochemistry and molecular biology graduate groups. Exploration of how basic mechanisms of molecular biology contribute to health and disease. Diseases related to animals, plants, and microbes will highlight fundamental concepts in the assembly, function and regulation of DNA, RNA, and protein.

#### 201D. Quantitative and Population Genetics (5)

Lecture—5 hours. Prerequisite: course 201A or consent of instructor. Basic concepts of quantitative and population genetics including gene and genotypic frequencies, multiple factor hypothesis, phenotypic and genotypic values, heritability, selection, genetic variation, the detection of quantitative trait loci and evolution in populations. Experimental and analytical methods.—S. (S.) Famula, Ross-Ibarra

#### 205. Molecular Genetics Laboratory (5)

Laboratory—15 hours. Prerequisite: Biological Sciences 101 (may be taken concurrently) or the equivalent, enrolled in Genetics Graduate Group. Students will conduct experiments in molecular genetics laboratories. Individual research problems will emphasize experimental design, experience with methodologies, and data interpretation. May be repeated up to three times for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**210. Horizontal Gene Transfer (3)**

Lecture/discussion—3 hours. Prerequisite: background in basic microbiology and genetics required; introductory course in molecular biology, biotechnology and microbial and animal/plant genetics recommended. Transfer of genes between unrelated organisms in nature. Dissemination of foreign DNA from genetically engineered organisms, including plants and animals. Mechanisms by which genes are transferred horizontally, and between kingdoms.—F. (F.)

**211. Concepts in Human Genetics and Genomics (3)**

Lecture/discussion—3 hours. Prerequisite: course 201A or the equivalent; course 201B, 201C or the equivalent recommended. Pass One restricted to graduate students enrolled in the Human Genetics Focus Group; Pass Two restricted to graduate students enrolled in Genetics Graduate Group; after that, open enrollment for graduate students up to 12 students, then undergraduates. Human genomic organization; genetic structure of populations; positional cloning, application of linkage, association, and haplotypes; quantitative trait loci analyses; integrative genetic studies of gene expression; DNA repair mechanisms in genetic disease; mutation analyses; epigenetics; mitochondrial disease; gene manipulation and therapy. Offered in alternate years.—(W.)

**220. Genomics and Biotechnology of Plant Improvement (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 101 or the equivalent. Integration of modern biotechnology and classical plant breeding including the impact of structural, comparative and functional genomics on gene discovery, characterization and exploitation. Also covers molecular markers, plant transformation, hybrid production, disease resistance, and novel output traits. (Same course as Plant Sciences 220.)—W. (W.) Neale

**225. Gene Therapy (3)**

Lecture/discussion—3 hours. Prerequisite: Genetics 201C, Molecular and Cellular Biology 214, or equivalent. Gene therapy from basic concepts to clinical applications. Topics include the human genome and genetic variation, genetic diseases, methods to manipulate gene expression, viral and non-viral delivery vectors, history and progress of gene therapy, case studies, and ethical issues. (Same course as Pharmacology & Toxicology 225.)—S. (S.) Anderson

**250. Functional Genomics: From Bench to Bedside (3)**

Lecture/discussion—3 hours. Prerequisite: course 201C, Molecular and Cellular Biology 214, or equivalent. Functional genomics (how genetic variation and epigenomics affect gene expression), with an emphasis on clinical relevance and applications. Topics include genetic variation and human disease, cancer therapeutics, and biomarker discovery. (Same course as Pharmacology & Toxicology 250.)—S. (S.) Diaz, LaSalle, Segal

**290. Seminar in Evolutionary, Developmental and Population Genetics (1)**

Seminar—1 hour. Topics of current interest in evolutionary, population, and developmental genetics. May be repeated for credit. (S/U grading only.) Offered in alternate years.—S. (S.)

**290A. Graduate Student Conference in Genetics (1)**

Conference—1 hour. Restricted to Genetics Graduate Group students. Student-given seminars on topics in genetics, with critiques by instructor and peers. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**291. Seminar in History of Genetics (2)**

Seminar—2 hours. Prerequisite: Biological Sciences 101. The development of modern genetic theories beginning with Mendel.—F. (F.) Quiros

**292. Seminar in Genomics and Epigenomics (1)**

Seminar—1 hour. Topics of current interest in genomics and epigenomics. May be repeated for credit. Offered in alternate years. (S/U grading only.)—(F.)

**293. Seminar in Animal Genetics (1-3)**

Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Emphasis on recent advances in the field of animal genetics, ranging from quantitative genetics to molecular biology as it relates to animals. Offered in alternate years.—S.

**294. Seminar in Human Genetics (2)**

Seminar—2 hours. Prerequisite: course 201A and consent of instructor. May be repeated for credit up to five times if topic differs. Topics of current interest in human genetics and genomics. Offered in alternate years.—W. Seldin

**295. Seminar in Molecular Genetics (1-3)**

Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Topics of current interest related to the structure, modification and expression of genes. Offered in alternate years.—F.

**296. Scientific Professionalism and Integrity (2)**

Lecture—1 hour; seminar—1 hour. Prerequisite: graduate standing or consent of instructor. Review of basic skills required of contemporary scientists. Topics include scientific conduct, manuscript preparation, grant writing, seminar presentations, and time management. Emphasis on responsibilities of scientists to factually and thoughtfully communicate results.—F. (F.) Yoder

**297. Seminar in Plant Genetics (1-3)**

Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Current topics in plant genetics will be examined in student-conducted seminars and discussion format. The integration of molecular, organismal and population genetics to address questions in plant biology will be emphasized.—(W.)

**298. Group Study (1-5)**

Prerequisite: consent of instructor. Group study of selected topics in genetics. (S/U grading only.)—F, W, S. (F, W, S.)

**299. Research (1-12)**

(S/U grading only.)—F, W, S. (F, W, S.)

**Professional****300. Methods in Teaching Genetics (1-3)**

Lecture/discussion. Prerequisite: graduate standing and consent of instructor. Practical experience in the methods and problems of teaching genetics. Includes analysis of texts and supporting material, discussion of teaching techniques, preparing for and conducting discussion or laboratory sections, formulating examinations under supervision of instructor. May be repeated for credit up to 3 times or 9 units if teaching in different genetics related course. (S/U grading only.)—F, W, S. (F, W, S.)

## Integrative Pathobiology (A Graduate Group)

Patricia Pesavento, D.V.M., Ph.D., Chairperson of the Group

Brian Murphy, D.V.M., Ph.D., Co-chairperson of the Group

**Group Office.** 5218, Vet Med 3A  
530-752-3737; <http://www.vetmed.ucdavis.edu/integrativepath/>

**Faculty**

Verena Affolter, D.V.M., Ph.D., Professor  
(Pathology, Microbiology and Immunology)

Kyriacos Athanasiou, Ph.D., Professor and Chair  
(Biomedical Engineering)

Robert Atwill, D.V.M., M.P.V.M., Ph.D., Professor  
(Population Health and Reproduction)

Danika Bannasch, D.V.M., Ph.D., Professor  
(Population Health and Reproduction)

Chris Barker, Ph.D., Assistant Adjunct Professor  
(Pathology, Microbiology, and Immunology)

Andreas Baumler, Ph.D., Professor  
(Microbiology and Immunology)

Peter A. Barry, Ph.D., Associate Professor  
(Pathology and Oncology)

Nicole Baumgarth, D.V.M., Ph.D., Professor  
(Pathology, Microbiology, and Immunology)

Charles L. Bevins, M.D., Ph.D., Professor  
(Microbiology and Immunology)

Dori L. Borjesson, D.V.M., M.P.V.M., Ph.D., Professor  
(Pathology, Microbiology and Immunology)

Walter M. Boyce, D.V.M., Ph.D., Professor  
(Pathology, Microbiology, and Immunology)

Robert J. Brosnan, D.V.M., Ph.D., Professor  
(Surgical and Radiological Sciences)

Barbara A. Byrne, D.V.M., Ph.D., Professor  
(Pathology, Microbiology, and Immunology)

Kermit Carraway, Ph.D., Professor  
(Biochemistry and Molecular Medicine)

Hongwu Chen, Ph.D., Associate Professor  
(Cancer Center, Basic Sciences)

Xinbin Chen, B.V.M., Ph.D., Professor  
(Surgical and Radiological Sciences)

Simon Cherry, Ph.D., Professor  
(Biomedical Engineering)

Bruno B. Chomel, D.V.M., Ph.D., Professor  
(Population Health and Reproduction)

Brett Chromy, Ph.D., Assistant Adjunct Professor  
(Pathology and Laboratory Medicine)

Lark L A Coffey, D.V.M., Ph.D., Assistant Professor  
(Pathology, Microbiology, and Immunology)

Patricia A. Conrad, D.V.M., Ph.D., Professor  
(Pathology, Microbiology, and Immunology)

Beate Crossley, D.V.M., Ph.D., M.P.V.M., Professor  
(Department of Medicine and Epidemiology)

James S. Cullor, D.V.M., Ph.D., Professor  
(Population Health and Reproduction)

Satya Dandekar, Ph.D., Professor  
(Microbiology and Immunology)

Wenbin Deng, Ph.D., Associate Professor  
(Biochemistry and Molecular Medicine)

Peter Dickinson, D.V.M., Ph.D., Assoc. Professor  
(Neurology/Neurosurgery)

Carol Erickson, Ph.D., Distinguished Professor  
Emeritus (Molecular and Cellular Biology)

Thomas B. Farver, Ph.D., Professor  
(Population Health and Reproduction)

Carrie Finno, D.V.M., Ph.D., Assistant Professor  
(Population Health and Reproduction)

Janet Foley, MS, D.V.M., Ph.D., Assistant Professor  
(Medicine and Epidemiology)

Rodrigo Gallardo, D.V.M., Ph.D., Assistant Professor  
(Population Health and Reproduction)

Damian Genotus, B.A., M.S., Ph.D., Assistant  
Professor (Anatomy, Physiology and Cell Biology)

Laurel J. Gershwin, D.V.M., Ph.D., Professor  
(Pathology, Microbiology, and Immunology)

Paramita Ghosh, Ph.D., Associate Professor  
(Biochemistry and Molecular Medicine)

Ralph Green, M.D., Ph.D., Professor  
(Medical Pathology and Laboratory Medicine)

Fuzheng Guo, Ph.D., Assistant Professional  
Researcher (Neurology)

James H. Jones, D.V.M., Ph.D., Professor  
(Surgical and Radiological Sciences)

Amy Kapatkin, B.S., D.V.M., M.S. Associate  
Professor (Surgical and Radiological Sciences)

Kevin Keel, D.V.M., Ph.D., Associate Professor  
(Pathology, Microbiology, and Immunology)

Imran Khan, Ph.D., M.B.A, Associate Adjunct  
Professor (Pathology and Laboratory Medicine)

Kit S. Lam, M.D., Ph.D., Professor  
(Hematology/Oncology)

Michael Lairmore, D.V.M., Ph.D., Professor and  
Dean (Pathology, Microbiology and Immunology)

Kent Leach, Ph.D., Professor  
(Biomedical Engineering)

Jian-Jian Li, M.D., Ph.D., Professor  
(Radiation Oncology)

Kent K.C. Lloyd, D.V.M., Ph.D., Professor  
(Anatomy, Physiology and Cell Biology)

Su Hao Lo, Ph.D., Professor  
(Biochemistry and Molecular Medicine)

Paul A. Luciw, Ph.D., Professor  
(*Pathology and Oncology*)  
Bruce G. Lyeth, Ph.D., Professor  
(*Neurological Surgery*)  
N. James MacLachlan, B.V.Sc., Ph.D., Professor  
(*Pathology, Microbiology, and Immunology*)  
John E. Madigan, M.S., D.V.M., Professor  
(*Medicine and Epidemiology*)  
Verónica Martínez-Cerdeño, Ph.D., Assistant Professor (*Pathology and Laboratory Medicine*)  
Jonna A.K. Mazet, D.V.M., M.P.V.M., Ph.D., Professor  
(*Medicine and Epidemiology*)  
Stephen McSorley, Ph.D., Professor  
(*Anatomy, Physiology and Cell Biology*)  
Matthew Mellema, Associate Professor  
(*Surgical and Radiological Sciences*)  
Stuart Meyers, D.V.M., Ph.D., Professor  
(*Anatomy, Physiology and Cell Biology*)  
Michael Mienaltowski, Ph.D., Assistant Professor  
(*Animal Science*)  
Chris J. Miller, D.V.M., Ph.D., Professor  
(*Pathology, Microbiology, and Immunology*)  
Lisa Miller, Ph.D., Professor  
(*Anatomy, Physiology and Cell Biology*)  
Suzanne Miyamoto, Ph.D., Assistant Research Biochemist (*Internal Medicine*)  
F. Charles Mohr, D.V.M., Ph.D., Professor of Clinical Anatomic Pathology (*Pathology, Microbiology, and Immunology*)  
Arta Monjazeb, M.D., Ph.D., Assistant Professor (*Radiation Oncology*)  
Peter F. Moore, B.V.Sc., Ph.D., Professor  
(*Pathology, Microbiology, and Immunology*)  
Brian Murphy, D.V.M., Associate Professor  
(*Pathology, Microbiology & Immunology*)  
William Murphy, M.D., Professor (*Dermatology*)  
Jorge Nieto, M.V.Z., Ph.D., Professor  
(*Surgical and Radiological Sciences*)  
Jan Nolta, Ph.D., Professor  
(*School of Medicine, Internal Medicine*)  
Joanne Paul-Murphy, D.V.M., Professor  
(*Medicine and Epidemiology*)  
Niels C. Pedersen, D.V.M., Ph.D., Professor  
(*Medicine and Epidemiology*)  
Patricia Pesavento, D.V.M., Ph.D., Professor  
(*Pathology, Microbiology & Immunology*)  
Kent E. Pinkerton, Ph.D., Professor (*Anatomy, Physiology and Cell Biology*) Distinguished Teaching Award-Graduate/Professional  
David E. Pleasure, M.D. Professor  
(*Neurology and Pediatrics*)  
Jerry S. Powell, M.D., Professor  
(*Anatomy, Physiology and Cell Biology*)  
Katherine Rauen, M.D., Ph.D., Professor  
(*Pediatrics*)  
William Reisen, Ph.D., Professor  
(*Pathology, Microbiology and Immunology*)  
Robert Rebhun, D.V.M., Ph.D., Associate Professor  
(*Surgical and Radiological Sciences*)  
Alexander Revzin, Ph.D., Associate Professor  
(*Biomedical Engineering*)  
Jeroen Saeij, Ph.D., Associate Professor  
(*Pathology, Microbiology, and Immunology*)  
Edward Schelegle, Ph.D., Professor  
(*Anatomy, Physiology, and Cell Biology*)  
Jared Shaw, Associate Professor (*Chemistry*)  
Christina Sigurdson, Associate Professor  
(*Pathology, Microbiology and Immunology*)  
Scott Simon, Ph.D., Professor  
(*Biomedical Engineering*)  
David Smith, Ph.D., Professor (*Anthropology*)  
Woutrina Smith, D.V.M., M.P.V.M., Ph.D., Associate Professor (*Medicine and Epidemiology*)  
Esteban Soto Martinez, D.V.M., Ph.D., Associate Professor (*Medicine and Epidemiology*)  
Ellen Sparger, D.V.M., Ph.D., Associate Professor  
(*Medicine and Epidemiology*)  
Joshua Stern, B.S., D.V.M., Assistant Professor  
(*Medicine and Epidemiology*)  
Jeffrey L. Stott, Ph.D., Professor  
(*Pathology, Microbiology, and Immunology*)  
Susan M. Stover, D.V.M., Ph.D., Professor  
(*Anatomy, Physiology and Cell Biology*)  
Julie Sutcliffe, Ph.D., Associate Professor  
(*Biomedical Engineering*)

Colleen Sweeney, Ph.D., Professor  
(*Biochemistry and Molecular Medicine*)  
Jane E. Sykes, B.V.Sc., Ph.D., Professor  
(*Medicine and Epidemiology*)  
Fern Tablin, V.M.D., Ph.D., Professor  
(*Anatomy, Physiology and Cell Biology*)  
Alice F. Tarantal, Ph.D., Professor (*Pediatrics*)  
Sara Thomasy, D.V.M., Ph.D., Associate Researcher  
(*Surgical and Radiological Sciences*)  
Jose V. Torres, Ph.D., Professor (*Microbiology*)  
Nam Tran, Ph.D., Assistant Professor  
(*Department of Pathology and Laboratory Medicine*)  
Renee M. Tsolis, Ph.D., Professor  
(*Microbiology and Immunology*)  
Francisco Uzal, D.V.M., Ph.D., Professor of Clinical Diagnostic Pathology (*Pathology, Microbiology, and Immunology*)  
Laura Van Winkle, Ph.D., Adjunct Professor  
(*Anatomy, Physiology and Cell Biology*)  
William Vernau, D.V.Sc., Ph.D., Associate Professor  
(*Pathology, Microbiology and Immunology*)  
Sebastian Wachsmann-Hogiu, M.D., Associate Professor (*Pathology*)  
Aijun Wang, Ph.D., Assistant Professor  
(*Surgery*)  
Johanna L. Watson, D.V.M., Ph.D., Associate Clinical Professor and Chair (*Medicine and Epidemiology*)  
Bart Weimer, Ph.D., Professor  
(*Population Health and Reproduction*)  
Robert H. Weiss, M.D., Professor  
(*Internal Medicine, Division of Nephrology*)  
Dennis W. Wilson, D.V.M., Ph.D., Professor  
(*Pathology, Microbiology, and Immunology*)  
Erik R. Wisner, D.V.M., Professor  
(*Surgical and Radiological Science*)  
Kevin Woolard, D.V.M., Ph.D., Assistant Professor  
(*Pathology, Microbiology and Immunology*)  
Jian Wu, M.D., Ph.D., Assistant Adjunct Professor  
(*Internal Medicine*)  
Reen W. Wu, Ph.D., Professor (*Internal Medicine*)  
Clare Yellowley, Ph.D., Professor  
(*Anatomy, Physiology and Cell Biology*)  
Chengji Zhou, Ph.D., Associate Professor  
(*Biochemistry and Molecular Medicine*)

**Graduate Study.** The Graduate Group in Integrative Pathobiology offers the M.S. and Ph.D. degrees for graduate study in disciplines concerned with disease processes. The group's focus is the study of the causes and nature of disease processes in animals and humans, with major emphasis on the mechanisms responsible for the development of diseases at the level of organ systems, the cell, or subcellular mechanisms. The group brings a wide array of scientific knowledge to this study, so that students with divergent interests can be accommodated in programs designed for individual needs. Beyond core courses selected from disciplines such as anatomy, bacteriology, genetics, immunology, parasitology, pathology, physiology, and virology, course programs are intentionally flexible.

**Preparation.** This program is primarily for students who have a professional medical degree; e.g., D.V.M., M.D., D.D.S. Students without a professional degree will be considered if they have an especially strong background in basic biomedical sciences.

**Graduate Adviser.** Jeffrey Stott (*Pathology, Microbiology, and Immunology*)

## Interior Design

See **Design, on page 233.**

## Internal Medicine

See **Medicine, School of, on page 427.**

## International Agricultural Development

(College of Agricultural and Environmental Sciences)  
International Agricultural Development is an interdisciplinary major in the Plant Sciences department.

**Faculty.** Includes members from various departments across colleges.

### B.S. Major Requirements:

#### Preparatory Subject Matter ..... 36-38 UNITS

International Agricultural Development	10.....
Plant Sciences 2 .....	4
Soil Sciences 10 or 100 .....	3-5
Economics 1A and 1B .....	8
Statistics 13 or Sociology 46B or Plant Sciences 120.....	4
Math 16A .....	3
Community and Regional Development 1 ..	4
Six units from: Agricultural and Resource Economics 15, Animal Science 41, 41L, Community and Regional Development 20, Nutrition 10, Plant Sciences 1, 15, 49.....	6

#### Depth Subject Matter ..... 32

Agricultural and Resource Economics 147 or Plant Sciences 101 .....	3
Economics 115A.....	4
Five units from: International Agricultural Development 142, 160, Plant Sciences 110A, 110C, 110L, 112, 130 .....	5
International Agricultural Development 103 and International Agricultural Development 170.....	8
Sociology 170 or Community and Regional Development 141 or 162.....	4
Community and Regional Development 142 or 149 or 152.....	4
Political Science 123 or 124 or Sociology 145A or Anthropology 126A or 126B or 131.....	4

#### Foreign Language Requirement ..... 0-15

Students must complete three sequenced quarters (15 units) of courses in one foreign language or its equivalent. Passing a foreign language proficiency examination, a score of 5, 4, or 3 on a foreign language Advanced Placement examination (except Latin), or a score of 550 on the SATII: Subject Test will also satisfy this requirement.

#### Internship Requirement ..... 4

Students must complete at least four units of internship. Internships can be chosen in consultation with an adviser. Internship requirement waived for students enrolled in the UC Education Abroad Program.

#### Areas of Specialization ..... 44-45

Agricultural Production Option .....	45
Biological Sciences 2A and 2B .....	10
Chemistry 2A and 2B .....	10
15 units from: Animal Science 118, 124, 136A, 136B, 143, 144, 145, 146, Avian Sciences 121, Entomology 110, 135, Environmental Horticulture 100, 133, Environmental Science and Management 100, Hydrology 124, International Agricultural Development 142, 160, Plant Pathology 120, Plant Sciences 110A, 110C, 110L, 112, 113, 114, 130, 150, 170A, 170B, 172, 176, Soil Sciences 109, 118 .....	15
Restricted Electives: Courses selected in consultation with an adviser.....	10
Trade and Economic Development Option .....	44-45
Mathematics 16B .....	3
Sociology 1 or Anthropology 2 .....	4-5

20 units from: Agricultural and Resource Economics 15, 100A, 100B, 115B, 120, 121, 130, 136, 138, 139, 175, 176, Community and Regional Development 141, Economics 160A, 160B, Textiles and Clothing 174.....	20
Restricted Electives: Courses selected in consultation with an adviser.....	17
<i>Environmental Issues Option</i> .....	45
Biological Sciences 2A and 2B .....	10
Environmental Science and Policy 1 .....	4
16 units from: Agricultural and Resource Economics 147, 175, 176, Environmental Science and Policy 100, 101, 105, 110, 160, 161, 170, 171, 172, 175, Plant Sciences 101, 147, 147L, 150, Environmental Horticulture 150, 160, 160L.....	16
Restricted Electives: Courses selected in consultation with an adviser.....	15
<i>Rural Communities Option</i> .....	45
Sociology 1 .....	4
Anthropology 2.....	4
16 units from: Community and Regional Development 140, 147, 149, 151, 152, 153A, 153B, 154, 164, 172, 176, 180.....	16
Restricted Electives: Courses selected in consultation with an adviser.....	20

**Total Units for Major ..... 116-134****International Agricultural Development Abroad..... 0-40**

**Major Adviser.** P. Brown in 3041 Wickson Hall (*Plant Sciences*)

**Advising Center** for the major is located in 1220 Plant and Environmental Sciences 530-752-1715.

**Minor Program Requirements:** UNITS

<b>International Agricultural Development</b> .....	<b>21-23</b>
International Agricultural Development 10 and Agricultural and Resource Economics 115A .....	8
Plant Sciences 101, 110A, 110C, 112 .....	6-7
International Agricultural Development 103, 170, 195A or Community and Regional Development 142 .....	7-8

**Minor Adviser.** P. Brown  
**Advising Center** for the minor is located in 1220 Plant and Environmental Sciences 530-752-1715.

**Courses in International Agricultural Development (IAD)**

Questions pertaining to the following courses should be directed to the instructor or to the Department of Plant Sciences Advising Center in 1220 Plant and Environmental Sciences at 530-752-1715.

**Lower Division****10. Introduction to International Agricultural Development (4)**

Lecture—3 hours; discussion—1 hour. Theories, practices and institutions relating to agricultural development; the interaction of changing social, cultural and economic organization through successive stages of economic development; impact of new agricultural technology on underdeveloped regions. GE credit: SocSci, Div, Wrt | SS, WC, WE.—W. (W.) Brown

**92. Internship (1-12)**

Internship—3-36 hours. Prerequisite: consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.)—F, W, S. (F, W, S.)

**Upper Division****103. Social Change and Agricultural Development (4)**

Lecture/discussion—4 hours. Prerequisite: introductory social science course (Anthropology, Sociology, Economics, International Agricultural Development).

How social and cultural factors influence technological change in agriculture; theories of diffusion of innovations; social impact analysis and technology assessment. GE credit: SocSci, Div | SS, WE.

**142. Equipment and Technology for Small Farms (2)**

Lecture—1 hour; laboratory—3 hours. Types and characteristics of agricultural equipment and technologies appropriate for small commercial farming. Adjustment and calibration of equipment. Selection of and budgeting for equipment. (Same course as Applied Biological Systems Technology 142.) GE credit: SciEng | QL, SE, VL.—S. (S.) Shafii

**160. Agroforestry: Global and Local Perspectives (3)**

Lecture/discussion—3 hours. Prerequisite: Plant Sciences 2 or Biological Sciences 1C or 2C; Plant Sciences 142 or 150 or Biological Sciences 2B or a general ecology course. Traditional and evolving use of trees in agricultural ecosystems; their multiple roles in environmental stabilization and production of food, fuel, and fiber; and socioeconomic barriers to the adoption and implementation of agroforestry practices. Not open for credit to students who have taken previously taken Agricultural Management and Rangeland Resources 160. (Former course Agricultural Management and Rangeland Resources 160.) Offered in alternate years. GE credit: SciEng | SE.—F. Gradiel

**170. Program Development for International Agriculture (4)**

Lecture/discussion—4 hours. Prerequisite: course 10. Principles of leadership and management for international agricultural development. Organizations and organizational behavior, and the implications for planning and administering organizations involved in the global development effort.—F. (F.)

**190. Proseminar in International Agricultural Development (1)**

Seminar—1 hour. Presentation and discussion of current topics in international agricultural development by visiting lecturers, staff and students. May be repeated for credit. (P/NP grading only.)

**192. Internship (1-12)**

Internship—3-36 hours. Prerequisite: consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.)—F, W, S. (F, W, S.)

**198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. Directed group study. (P/NP grading only.)—F, W, S. (F, W, S.)

**199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. Special study for advanced undergraduates. (P/NP grading only.)—F, W, S. (F, W, S.)

**Graduate****200N. Philosophy and Practice of Agricultural Development (5)**

Lecture/discussion—5 hours; term paper. Introduces key elements of philosophy and practice of agricultural development in less developed countries; major paradigms of development; historical context within which these paradigms operate; various development techniques and initiatives emerging from agricultural production to institutional capacity building and management. Not open for credit to students who have completed former course 202.—F. (F.) Bell, Bunn

**201. The Economics of Small Farms and Farming Systems (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural and Resource Economics 100A. Economic perspective on small farm development. Establishes a basis for predicting farmers' responses to changes in the economic environment, and for proposing government policies to increase small farm production and improve farmer and national welfare.—W. (W.) Vosti

**202N. Analysis and Determinants of Farming Systems (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Sciences 150 or the equivalent. Unifying concepts of cropping systems in temperate and tropical climatic zones; agroecosystems stability, diversity and sustainability; management strategies, resource use efficiency and their interactions; role of animals, their impact on energy use efficiency, nutrient cycling, and providing food and power. Not open for credit to students who have completed former course 200.—S. (S.) Bunn, Van Kessel

**203N. Project Planning and Evaluation (4)**

Discussion—1 hour; workshop—3 hours. Prerequisite: courses 200N (or former course 202), 201, 202N (or former course 200). Interdisciplinary setting for application of student skills and specialization to a "real world" development project. Focus on team-building and effective interdisciplinary problem-solving methods, with the objective of producing a project document and presentation within a specified deadline. Not open for credit to students who have completed former course 203.—S. (S.)

**290. Seminar in International Agricultural Development (1-2)**

Seminar—1-2 hours. Prerequisite: consent of instructor. Discussion and critical evaluation of advanced topics and issues in international agricultural development. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.) Scow, Van Horn

**291. Topics in International Agricultural Development (1-3)**

Lecture/discussion—1-3 hours. Prerequisite: consent of instructor. Selected topics dealing with current issues in agricultural development in lesser developed nations. Variable content. May be repeated one time for credit.—F, W, S. (F, W, S.)

**292. Graduate Internship (1-12)**

Internship—3-36 hours. Prerequisite: participation in H. Humphrey Fellow Program or consent of instructor. Individually designed supervised internship, off or on campus, in community, business or institutional setting. Developed with advice of faculty mentor and Humphrey Coordinator. (S/U grading only.)—F, W, S. (F, W, S.)

**298. Directed Group Study (1-5)**

Prerequisite: consent of instructor. Directed group study. (S/U grading only.)—F, W, S. (F, W, S.)

**299. Research (1-12)**

Prerequisite: consent of instructor. Research. (S/U grading only.)—F, W, S. (F, W, S.)

**Professional****396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. Teaching assistant training practicum. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**International Agricultural Development (A Graduate Group)**

Kate Scow, Ph.D., Professor (*Land, Air, and Water Resources*) Chairperson of the Group

**Group Office.** 1220 Plant and Environmental Sciences Building, 530-752-1715;  
<http://iad.ucdavis.edu>

**Faculty**

Kassim Al-Khatib, Ph.D., Professor (*Plant Sciences*) Sharif Aly, Ph.D., Associate Professor

(*Population Health and Reproduction*)

Roger Baldwin, Ph.D., Associate Cooperative Extension Specialist (*Wildlife, Fish, and Conservation Biology*)

Diane M. Barrett, Ph.D., Specialist in Cooperative Extension (*Food Science and Technology*)

Mark Bell, Ph.D., Academic Administrator  
*(International Programs, College of Agricultural and Environmental Sciences)*  
 Stephen Boucher, Ph.D., Associate Professor  
*(Agricultural and Resource Economics)*  
 Patrick H. Brown, Ph.D., Professor (*Plant Sciences*)  
 David Bunn, Ph.D., Assistant Adjunct Professor  
*(Animal Science)*  
 Colin A. Carter, Ph.D., Professor  
*(Agricultural and Resource Economics)*  
 Michael R. Carter, Ph.D., Professor  
*(Agricultural and Resource Economics)*  
 Patricia A. Conrad, D.V.M., Ph.D., Professor  
*(Pathology, Microbiology, and Immunology)*  
 Diana Davis, Ph.D., Associate Professor (*History*)  
 Kathryn G. Dewey, Ph.D., Professor (*Nutrition*)  
 Richard Evans, Ph.D., Specialist in Cooperative Extension (*Plant Sciences*)  
 James Fadel, Ph.D., Professor (*Animal Science*)  
 Fadi Fathallah, Ph.D., Professor  
*(Biological and Agricultural Engineering)*  
 Steven Fennimore, Ph.D., Cooperative Extension Specialist (*Plant Sciences*)  
 Louise Ferguson, Ph.D., Specialist in Cooperative Specialist (*Plant Sciences*)  
 Howard Ferris, Ph.D., Professor (*Nematology*)  
 Albert Fischer, Ph.D., Professor (*Plant Sciences*)  
 Ryan E. Galt, Ph.D., Assistant Professor  
*(Human Ecology)*  
 Amélie Gaudin, Ph.D., Assistant Professor  
*(Plant Sciences)*  
 Paul L. Gepts, Ph.D., Professor (*Plant Sciences*)  
 Robert Gilbertson, Ph.D., Professor (*Plant Pathology*)  
 Rachael Goodhue, Ph.D., Professor  
*(Agricultural and Resource Economics)*  
 Thomas Gradiel, Ph.D., Professor (*Plant Sciences*)  
 Liza Grandia, Ph.D., Associate Professor  
*(Native American Studies)*  
 Richard D. Green, Ph.D., Professor  
*(Agricultural and Resource Economics)*  
 Luis Guarinzo, Ph.D., Professor  
*(Human Ecology)*  
 Timothy K. Hartz, Ph.D., Specialist in Cooperative Extension and Lecturer (*Plant Science*)  
 Robert Hijmans, Ph.D., Associate Professor  
*(Environmental Science and Policy)*  
 William Horwath, Ph.D., Professor  
*(Land, Air and Water Resources)*  
 Russell C. Hovey, Ph.D., Professor (*Animal Science*)  
 Silas S. O. Hung, Ph.D., Professor (*Animal Science*)  
 Lovell S. Jarvis, Ph.D., Professor  
*(Agricultural and Resource Economics)*  
 Bryan M. Jenkins, Ph.D., Professor  
*(Biological and Agricultural Engineering)*  
 Marion Jenkins, Ph.D., Research Engineer  
*(Civil and Environmental Engineering)*  
 Katrina Jessoee, Ph.D., Assistant Professor  
*(Agricultural and Resource Economics)*  
 Lucia Kaiser, Ph.D., Community Nutrition Specialist in Cooperative Extension (*Nutrition*)  
 Ermias Kebreab, Ph.D., Professor (*Animal Science*)  
 Kurt Kornbluth, Ph.D., Adjunct Professor  
*(Biological and Agricultural Engineering)*  
 Dietmar Kuelz, Ph.D., Professor (*Animal Science*)  
 Bruce Linquist, Ph.D., Specialist in Cooperative Extension (*Plant Sciences*)  
 Jay Lund, Ph.D., Professor  
*(Civil and Environmental Engineering)*  
 Mark Lundy, Ph.D., Assistant Specialist in Cooperative Extension (*Plant Sciences*)  
 Travis Lybbert, Ph.D., Associate Professor  
*(Agricultural and Resource Economics)*  
 Philip E. Martin, Ph.D., Professor  
*(Agricultural and Resource Economics)*  
 Mark A. Matthews, Ph.D., Professor  
*(Viticulture and Enology)*  
 G. David Miller, M.Sci., Lecturer (*Plant Sciences*)  
 Elizabeth J. Mitcham, Ph.D., Specialist in Cooperative Extension (*Plant Sciences*)  
 Jeffrey P. Mitchell, Ph.D., Specialist in Cooperative Extension and Lecturer (*Plant Sciences*)  
 Christian Nansen, Ph.D., Assistant Professor  
*(Entomology and Nematology)*  
 Dan Potter, Ph.D., Professor (*Plant Sciences*)

Daniel Putnam, Ph.D., Cooperative Extension Specialist, Agronomist and Lecturer  
*(Plant Sciences)*  
 Pamela C. Ronald, Ph.D., Professor  
*(Plant Pathology)*  
 Roberto D. Sainz, Ph.D., Professor (*Animal Science*)  
 Richard Sexton, Ph.D., Professor  
*(Agricultural and Resource Economics)*  
 Rajinder Paul Singh, Ph.D., Professor  
*(Biological and Agricultural Engineering)*  
 Lucas Silva, Ph.D., Professional Researcher  
*(Land, Air, and Water Resources)*  
 Michael P. Smith, Ph.D., Professor  
*(Human Ecology)*  
 Christine Stewart, Ph.D., Assistant Professor  
*(Nutrition)*  
 Daniel A. Sumner, Ph.D., Professor  
*(Agricultural and Resource Economics)*  
 J. Edward Taylor, Ph.D., Professor  
*(Agricultural and Resource Economics)*  
 Li Tian, Ph.D., Associate Professor (*Plant Sciences*)  
 Tom Tomich, Ph.D., Professor and Director  
*(Sustainable Agriculture Research and Education Program)*  
 Cary Trexler, Ph.D., Associate Professor  
*(School of Education)*  
 Mark Van Horn, M.Sci., Lecturer (*Plant Sciences*)  
 Chris van Kessel, Ph.D., Professor (*Plant Sciences*)  
 Stephen Vosti, Ph.D., Adjunct Professor  
*(Agricultural and Resource Economics)*  
 Karen Watson-Gegeo, Ph.D., Professor  
*(School of Education) Distinguished Graduate Mentoring Award*  
 Joshua Viers, Ph.D., Associate Research Scientist  
*(Environmental Science and Policy)*  
 Aram A. Yengoyan, Ph.D., Professor (*Anthropology*)  
 Tilahun D. Yilma, Ph.D., Professor  
*(Pathology, Microbiology, and Immunology)*  
 Glenn Young, Ph.D., Professor  
*(Food Science and Technology)*  
 Minghua Zhang, Ph.D., Professor  
*(Land, Air and Water Resources)*  
 Ruihong Zhang, Ph.D., Professor  
*(Biological and Agricultural Engineering)*  
 Richard A. Zinn, Ph.D., Professor (*Animal Science*)

### Emeriti Faculty

Stephen Brush, Ph.D., Professor Emeritus  
*(Human Ecology)*  
 James Grieshop, Ph.D., Specialist in Cooperative Extension Emeritus  
*(Human Ecology)*  
 James Hill, Ph.D., Specialist in Cooperative Extension Emeritus  
*(Plant Sciences)*  
 Alexander F. McCalla, Ph.D., Professor Emeritus  
*(Agricultural and Resource Economics)*  
 E. Dean MacCannell, Ph.D., Professor Emeritus  
*(Environmental Design)*  
 Richard E. Plant, Ph.D., Professor Emeritus  
*(Plant Sciences)*

**Graduate Study.** The International Agricultural Development M.S. degree program prepares students for careers in global agricultural and rural development, especially, but not exclusively, of developing and less-industrialized regions. This is an interdisciplinary program designed to provide students with knowledge and skills that will enable them to implement, facilitate, and manage programs that enhance agricultural development, resource management, and rural life.

Students are prepared to realize biological and technological improvement in agricultural and natural systems to facilitate social innovation. Training in International Agricultural Development includes both breadth and depth components. Breadth components, required of all M.S. students, aim to establish an understanding of the issues in international development as they relate to agriculture and the environment. These include the history and philosophy of development, leadership and management techniques, fundamentals of farming systems, and agricultural economics. Students acquire depth in their own areas of specialization within the agricultural and social sciences. The areas include agricultural and resource economics, agricultural engineering, agronomy, animal science, anthropology, aquacul-

ture, avian science, community development, ecology, economics, entomology, environmental design, environmental toxicology, food science, gender, geography, horticulture, nutrition, plant pathology, plant biology, plant protection and pest management, political science, preventive veterinary medicine, range science, sociology, soil science, sustainable agriculture, vegetable crops, viticulture, and water science.

Practical and on-site experience with development issues is encouraged and facilitated by guidance from the group's faculty members, who possess a wide range of experience in international development.

**Graduate Adviser.** Contact the Group office.

## International and Community Nutrition

Kathryn G. Dewey, Ph.D., Program Director

**Program Office.** 3253 Meyer Hall  
 530-752-1992;  
<http://picn.ucdavis.edu/>

### Faculty

Lindsay H. Allen, Ph.D., R.D., Research Professor  
*(Nutrition)*  
 Jay Belsky, Ph.D., Professor (*Human Development*)  
 Monique Borgerhoff-Mulder, Ph.D., Research Professor (*Anthropology*)  
 Michael R. Carter, Ph.D., Professor  
*(Agricultural and Resource Economics)*  
 Caroline Chantry, M.D., Professor (*Pediatrics*)  
 Kathryn G. Dewey, Ph.D., Distinguished Professor  
*(Nutrition)*  
 Lia C. H. Fernald, Ph.D., Associate Professor  
*(Public Health Nutrition, Community Health & Human Development, UC Berkeley)*  
 Leah Hibel, Ph.D., Assistant Professor  
*(Human Development)*  
 Robert J. Hijmans, Ph.D., Associate Professor  
*(Environmental Science and Policy)*  
 Lovell S. Jarvis, Ph.D., Professor  
*(Agricultural and Resource Economics)*  
 Bo L. Lönnental, Ph.D., Distinguished Professor  
*(Nutrition)*  
 Travis J. Lybbert, Ph.D., Associate Professor  
*(Agricultural and Resource Economics)*  
 Christine P. Stewart, Ph.D., Assistant Professor  
*(Nutrition)*

### Emeriti Faculty

Kenneth H. Brown, M.D., Distinguished Professor Emeritus  
 Betty J. Burri, Ph.D., Adjunct Professor Emerita  
 Louis E. Grivetti, Ph.D., Professor Emeritus  
 Charles H. Halsted, M.D., Professor Emeritus  
 Lucia L. Kaiser, Ph.D., Specialist in Cooperative Extension  
 Janet King, Ph.D., Professor Emerita  
 Fernando E. Viteri, M.D., Ph.D., Professor Emeritus

### Affiliated Faculty

Katie P. Adams, Ph.D., Assistant Project Scientist  
*(Nutrition)*  
 Joanne E. Arsenault, Ph.D., MPH, R.D., Associate Project Scientist  
*(Nutrition)*  
 Reina Engle-Stone, Ph.D., Assistant Research Nutritionist  
*(Nutrition)*  
 Marjorie J. Haskell, Ph.D., Associate Researcher  
*(Nutrition)*  
 Sonja Y. Hess, Ph.D., Associate Researcher  
*(Nutrition)*  
 Kevin D. Laugero, Ph.D., Associate Adjunct Professor  
*(Nutrition)*  
 Susana L. Matias, Ph.D., Assistant Project Scientist  
*(Nutrition)*  
 Elizabeth L. Prado, Ph.D., Assistant Project Scientist  
*(Nutrition)*  
 Charles B. Stephensen, Ph.D., Adjunct Professor  
*(Nutrition)*

Marta Van Loan, Ph.D., Associate Adjunct Professor (*Nutrition*)  
 Stephen A. Vosti, Ph.D., Associate Adjunct Professor (*Agricultural and Resource Economics*)  
 K. Ryan Wessells, Ph.D., Assistant Project Scientist (*Nutrition*)

**Graduate Study.** The Program in International and Community Nutrition, an Organized Research Unit located in the Department of Nutrition, coordinates specialized course work and research leading to the Designated Emphasis in International and Community Nutrition for students in various graduate programs. The program focuses on both theoretical and practical issues concerning the identification, treatment, and prevention of human nutritional problems in low-income countries and in disadvantaged groups in the United States. Students enrolled in the Designated Emphasis are expected to (1) complete the course requirements already established by their respective graduate programs, (2) participate in a weekly advanced seminar in international and community nutrition, (3) complete additional core courses in international nutrition (Nutrition 219A, 219B, 258) and selected courses in the related disciplines of epidemiology, statistics, and social and behavioral sciences, and (4) conduct their dissertation research on a relevant topic under the supervision of a professor who is a member of the Program in International and Community Nutrition.

Students accepted into the following doctoral programs are automatically eligible to participate in the Designated Emphasis: Nutrition, Agricultural and Resource Economics, Epidemiology, Anthropology, and Human Development. Students from other programs may also be accepted by special request to the Program Director. Upon graduation, students receive a Ph.D. in their major field, with specific recognition for the Designated Emphasis in International and Community Nutrition.

**Graduate Adviser.** Contact the Program office.

## International Commercial Law (A Graduate Group)

Daniel L. Simmons, J.D., Chairperson of the Group  
 Beth Greenwood, J.D., Associate Dean, International Programs, UC Davis School of Law

**Group Office.** International Law Programs, School of Law & UC Davis Extension, 400 Mrak Hall Drive, Davis, CA 95616; [ilm@ucdavis.edu](mailto:ilm@ucdavis.edu) <http://www.law.ucdavis.edu/international>

### Faculty

Courses are taught by School of Law faculty from UC Davis and other University of California law schools, the Graduate School of Management, Departments of Economics and Agricultural and Resource Economics. Additionally, outstanding practitioners from private practice and government—lawyers, economists, bankers, businessmen—have acted as adjunct faculty to provide an applied perspective through lectures, simulations and case studies.

### Graduate Study

The Graduate Group in International Commercial Law offers a program of study and research leading to the LL.M. degree through a summer only program. Students are required to take 40 quarter units of study over two, three, four, or five summers. The classes are taught in an intensive format of 20 hours per week or four hours per day, two hours of lecture in the morning, two hours in the afternoon. Candidates begin the program by examining the fundamentals of the U.S. legal system with special emphasis on business and trade law. They complete the Orientation in U.S.A. Law program, two of the specialized programs in international commercial law and the American Legal System Research Seminar. In addition, participants take intensive elective

courses with an international perspective designed specifically for the master's degree program. Students also complete a capstone writing project. Elective courses then provide in-depth study in focused topics such as private international law, conflict of laws, intellectual property, business associations, antitrust, tax, securities and finance and the like. Students also complete a research paper.

### Preparation

International applicants must submit satisfactory evidence of completion of a degree program or equivalent involving academic legal training at an accredited educational institution. Applicants from the United States must have completed a bachelor's degree plus a J.D. I.I.B., or equivalent degree from an accredited United States law school. A period of law practice or legal experience and/or advanced legal studies is preferred but not required.

**Graduate Advisers.** Beth Greenwood (*International Programs, School of Law*), Dan Simmons (*School of Law*)

### Courses in International Commercial Law (ICL)

ICL courses are taught in an intensive format during the summer special session. For more information, contact the International Law Programs at 530-752-6081 or [ilm@ucdavis.edu](mailto:ilm@ucdavis.edu).

### Graduate

#### 201. Orientation in United States Law (7)

Lecture/discussion—20 hours. Prerequisite: Law school education or the equivalent. Investigation of the Common Law System of the United States. Includes structure of the U.S. government, Constitutional law, contracts, torts, real property, consumer law, securities law, intellectual property, antitrust, taxation, labor law, environmental law, ethics, remedies, legal research and trial practice.

#### 201A. Fundamentals in United States Law (4)

Lecture/discussion—20 hours. Prerequisite: Law school education or equivalent. Investigation of the Common Law System of the U.S. Includes the American constitutional system, the American judiciary, the American civil trial, and foundational substantive and procedural law such as real property, torts, criminal law and procedure, civil procedure, and contracts.

#### 201B. Advanced Topics in United States Law (3)

Lecture/discussion—20 hours. Prerequisite: Law School education or equivalent. Orientation to advanced topics in U.S. law: Intellectual Property (including copyright and trademarks), Commercial and Consumer Law, Advanced Contracts, Antitrust, Taxation, Remedies, Labor Law, Environmental Law, Dispute Resolution, Remedies and introduction to trial techniques and legal research/writing.

#### 202. Introduction to Contracts (4)

Lecture/discussion—20 hours. Prerequisite: Law school education or the equivalent. Examines sorts of promises that are enforced and the nature of protection given promissory obligations in both commercial and noncommercial transactions. Inquiry is made into the means by which traditional doctrine adjusts to changing social demands.

#### 202A. Introduction to Contracts Formation (2)

Lecture/discussion—20 hours. Prerequisite: Law school education or equivalent. Examines formation of the sorts of promises that are enforced and the nature of protection given promissory obligations in both commercial and noncommercial transactions. Inquiry is made into the means by which traditional doctrine adjusts to changing social demands.

#### 202AS. Introduction to Contracts Formation (2)

Lecture/discussion—20 hours. Prerequisite: Law School education or equivalent. Examines formation of the sorts of promises that are enforced and the nature of protection given promissory obligations in

both commercial and noncommercial transactions. Inquiry is made into the means by which traditional doctrine adjusts to changing social demands. Offered irregularly.

#### 202B. Contracts Performance (2)

Lecture/discussion—20 hours. Prerequisite: Law school education or equivalent. Examines issues of performing promises that are enforceable and possible breach of promissory obligations in both commercial and noncommercial transactions. Inquiry is made into the means by which traditional doctrine adjusts to changing social demands.

#### 202BS. Contracts Performance (2)

Lecture/discussion—20 hours. Prerequisite: Law school education or equivalent; course 202A or equivalent. Examines issues of performing promises that are enforceable and possible breach of promissory obligations in both commercial and noncommercial transactions. Inquiry is made into the means by which traditional doctrine adjusts to changing social demands. Offered irregularly.

#### 203. Civil Procedure (2)

Lecture/discussion—20 hours. Prerequisite: Law school education or the equivalent. Study of the fundamental and recurrent problems in civil actions including the methods used by federal and state courts to resolve civil disputes.

#### 204. International Joint Ventures (3)

Lecture/discussion—20 hours. Prerequisite: Law School education or equivalent; course 201. International and U.S. business and legal transactions. Legal planning, problem solving, decision making and negotiations related to the break-up and dissolution of a major international joint venture. U.S. laws including finance, tax, bankruptcy, labor, antitrust, environmental, corporate structures and intellectual property.

#### 205. Introduction to Constitutional Law (4)

Lecture/discussion—20 hours. Prerequisite: Law school education or the equivalent. Principles, doctrines and controversies regarding the structure and division of powers in American government. Includes judicial review, jurisdiction, standing to sue, federalism, federal and state powers and immunities, and the separation of powers among branches of the federal government.

#### 205A. Overview of US Constitutional Law (2)

Lecture/discussion—20 hours. Prerequisite: Law School education or equivalent. Principles, doctrines and controversies regarding the structure and division of powers in American government. Includes judicial review, jurisdiction, standing to sue, federalism, federal and state powers and immunities, and the separation of powers among branches of the federal government.

#### 205AS. Overview of US Constitutional Law (2)

Lecture/discussion—20 hours. Prerequisite: Law School education or equivalent. Principles, doctrines and controversies regarding the structure and division of powers in American government. Includes judicial review, jurisdiction, standing to sue, federalism, federal and state powers and immunities, and the separation of powers among branches of the federal government.

#### 205B. Constitutional Law—Protection of Individual Rights (2)

Lecture/discussion—20 hours. Prerequisite: Law School education or equivalent. Principles, doctrines and controversies regarding the U.S. Constitution Bill of Rights, including due process of law, equal protection, freedom of expression, freedom of religion, state action, and congressional legislation in aid of civil rights and liberties.

#### 211. Negotiations and Alternative Dispute Resolution (1)

Lecture/discussion—10 hours. Prerequisite: course 201; law school education or the equivalent. Mechanisms for resolving disputes including the alterna-

tives to litigation such as negotiation, mediation, and arbitration. Advantages and disadvantages of each approach.

### **212. Introduction to Negotiation (2)**

Lecture/discussion—20 hours. Prerequisite: Law school education or the equivalent. Introduction to theoretical and empirical approaches to negotiation for the purposes of making deals and resolving legal disputes.

### **212S. Introduction to Negotiation (2)**

Lecture/discussion—20 hours. Prerequisite: Law School education or equivalent. Introduction to theoretical and empirical approaches to negotiation for the purposes of making deals and resolving legal disputes.

### **214. Advanced Negotiation (2)**

Lecture/discussion—20 hours. Prerequisite: Law school education or the equivalent. Principles and empirical approaches to advanced negotiations including negotiation framework, models, styles, multiple party/issue negotiations and settlements.

### **214S. Advanced Negotiation (2)**

Lecture/discussion—20 hours. Prerequisite: Law school education or equivalent. Principles and empirical approaches to advanced negotiations including negotiation framework, models, styles, multiple party/issue negotiations and settlements.

### **215. Business Associations (4)**

Lecture/discussion—20 hours. Prerequisite: course 201; law school education or the equivalent. Legal rules and concepts applicable to business associations including general partnerships, joint ventures, limited partnerships, limited liability entities, and sole proprietorships.

### **215S. Business Associations (4)**

Lecture/discussion—20 hours. Prerequisite: Law School education or equivalent; course 201. Legal rules and concepts applicable to business associations including general partnerships, joint ventures, limited partnerships, limited liability entities, and sole proprietorships. Offered irregularly.

### **216. International Business Transactions (2)**

Lecture/discussion—20 hours. Prerequisite: course 201; law school education or the equivalent. Legal problems arising from international business transactions. Focus on international sales contracts, choice of law, forum selection clauses, letters of credit, transfers of technology, regulation of bribery, development of joint ventures, repatriation of profits, foreign exchange problems, and national efforts to control imports.

### **217. Alternative Dispute Resolution (2)**

Lecture/discussion—20 hours. Prerequisite: Law school education or the equivalent. Introduces students to a wide variety of alternative dispute resolution procedures, with an in-depth emphasis on negotiation, mediation and arbitration.

### **219. Advanced Writing Project (4)**

Project. Prerequisite: course 201, law school education or the equivalent. The completion of a written research project under the active supervision of a faculty member in satisfaction of the research-writing requirement. (S/U grading only.)

### **220. United States Taxation of Multinational Investments (2)**

Lecture/discussion—20 hours. Prerequisite: course 201; law school education or the equivalent. An analysis of the United States taxation of multinational investments including jurisdiction of tax, the U.S. tax system, foreign tax credits, treaties, and transfer pricing.

### **227. Criminal Procedure (2)**

Lecture/discussion—20 hours. Prerequisite: Law school education or equivalent. Federal constitutional limits on government authority to gather evidence and investigate crime. Includes Fourth Amendment limits on search, seizure, and arrest; Fifth Amendment privilege against self-incrimination; Sixth Amendment right to counsel.

### **228A. Mergers and Acquisitions Law (2)**

Lecture/discussion—20 hours. Prerequisite: Law School education or equivalent. Practical approach to mergers and acquisitions with an in-depth look at the planning, negotiation and completion of mergers and acquisitions.

### **228AS. Mergers and Acquisitions Law (2)**

Lecture/discussion—20 hours. Prerequisite: Law School education or equivalent. Practical approach to mergers and acquisitions with an in-depth look at the planning, negotiation and completion of mergers and acquisitions.

### **236. United States Securities Law and Regulation (2)**

Lecture/discussion—20 hours. Prerequisite: course 201; law school education or the equivalent. Structural and jurisdictional issues associated with securities practice. Topics include the regulation of public offerings, transactions by corporate insiders, regulation of corporate disclosure and conduct, and the liabilities of corporations and individuals under anti-fraud provisions.

### **239. Mediation (2)**

Lecture/discussion—20 hours. Prerequisite: Law school education or the equivalent. Introduction to the mediation process. Development of communication skills, the ability to analyze disputes, to understand why mediations succeed or fail, and understand the advantages and limitations of mediation as a method of resolving disputes.

### **242. Private International Law (2)**

Lecture/discussion—20 hours. Prerequisite: course 201; Law School education or equivalent. Operating law across national borders; emphasis on methods of resolving international disputes. International aspects of jurisdiction, choice of law, judgment enforcement, forum choice, process service, taking of evidence, foreign sovereign immunity, extraterritorial regulation of antitrust, securities; other national laws.

### **242S. Private International Law (2)**

Lecture/discussion—20 hours. Prerequisite: course 201; Law School education or equivalent. Operating law across national borders; emphasis on methods of resolving international disputes. International aspects of jurisdiction, choice of law, judgment enforcement, forum choice, process service, taking of evidence, foreign sovereign immunity, extraterritorial regulation of antitrust, securities; other national laws.

### **247. Banking Law (1)**

Lecture/discussion—10 hours. Prerequisite: course 201; law school education or the equivalent. Institutional features of international banking transactions, the structure of large financial deal, and the mechanics of overseeing large loans. Emphasis on negotiable instruments such as bills of lading, letters of credit, standby letters of credit, and interbank transactions.

### **249. Comparative Law (1)**

Lecture/discussion—10 hours. Prerequisite: course 201; law school education or the equivalent. A comparative study of the development of schools of legal thought, chiefly Common law systems and Civil law traditions. Attention to the historical reasons for their divergence, contemporary approaches to universal problems such as succession, torts, and contracts, the cross-fertilization of laws and difficulties commonly associated with importing foreign law into new territory.

### **250. International Trade Law (3)**

Lecture/discussion—20 hours. Prerequisite: course 201; law school education or the equivalent. An investigation of global trading systems including international trade in goods and services, e-commerce, international intellectual property, international tax planning and investment. Includes substantive and procedural provisions of the World Trade Organization (WTO) and the North American Free Trade Agreement (NAFTA). Offered in alternate years.

### **251. United States Litigation Issues (1)**

Lecture/discussion—10 hours. Prerequisite: course 201; law school education or the equivalent. Prevention and resolution of disputes in international commerce. Emphasis on preparing for a trial in the United States. Includes the study of pre-trial motions, jury selection, opening statements, rules of evidence, closing arguments, and the selection of appropriate strategies.

### **262. Antitrust (1)**

Lecture/discussion—10 hours. Prerequisite: course 201; law school education or the equivalent. Historical and institutional background of antitrust law in the United States. The statutory framework including price fixing, limits on distribution, monopolization and mergers, and reporting requirements.

### **270. Financing International Transactions (3)**

Lecture/discussion—20 hours. Prerequisite: course 201; law school education or the equivalent. How capital is raised in international markets. Investment strategies for U.S. markets. Taxation of financial investments, international currency regulation, and assessing rates of return on international investments.

### **274. Intellectual Property (2)**

Lecture/discussion—20 hours. Prerequisite: course 201; law school education or the equivalent. Intensive study of intellectual property law. Including copyright, trademark and patent law and unfair competition.

### **274S. Intellectual Property (2)**

Lecture/discussion—20 hours. Prerequisite: Law School or equivalent; course 201. Intensive study of intellectual property law. Including copyright, trademark and patent law and unfair competition.

### **283. Contract Remedies (2)**

Lecture/discussion—20 hours. Prerequisite: Law school education or equivalent. Covers a range of remedies for contract breach: remedies under common law and equity, liquidated damages clauses, remedies for mistake and unconscionability as well as breach of contract for the Sale of Goods under UCC Article II.

### **283S. Contract Remedies (2)**

Lecture/discussion—20 hours. Prerequisite: Law School education or equivalent; course 202A, 202B or equivalent. Covers a range of remedies for contract breach: remedies under common law and equity, liquidated damages clauses, remedies for mistake and unconscionability as well as breach of contract for the Sale of Goods under UCC Article II.

### **285. Environmental Law (2)**

Lecture/discussion—20 hours. Prerequisite: Law school education or the equivalent. Introduction to federal and state environmental law. Historical development of environmental law; the role of courts, the legislature and the executive branch in the development and implementation of environmental policy. Review of major statutes.

### **289. Licensing Academy in Intellectual Property & Technology (4)**

Lecture/discussion—20 hours. Prerequisite: course 201. Law School education or equivalent. Intellectual property as it relates to current forms of legal protection and how new innovations fit into these models, including public-private technology transfer, patents, institutional objectives, technology transfer offices, startups, and licenses.

### **290. American Legal System Research Seminar (1)**

Seminar—5 hours. Prerequisite: course 201, law school education or equivalent. American legal system and its structure. Legal research methodologies and presentation with attention to analysis, synthesis, organization, and editing techniques common to legal writing. (S/U grading only.)

### **291C. International Commercial Law Seminar (4)**

Lecture/discussion—20 hours. Prerequisite: course 201; Law School education or equivalent. Advanced seminar on a current topic in International Commer-

cial Law. Offered at the University of Cologne in Cologne, Germany for two weeks each summer. May be repeated three times for credit when topic differs.

### **292. International Commercial Law Seminar (1-4)**

Lecture/discussion—20 hours. Prerequisite: Law school education or equivalent. Advanced seminar in a current topic in International Commercial Law. Topic will change each year the course is offered. May be repeated two times for credit when topic differs.

### **292S. International Commercial Law Seminar (1-4)**

Lecture/discussion—20 hours. Prerequisite: Law school education or equivalent. Advanced seminar in a current topic in International Commercial Law. Topic will change each year the course is offered. May be repeated two times for credit when topic differs.

### **299. Advanced Research in Legal Problems (1-4)**

Prerequisite: course 201; law school education or the equivalent. Permission of supervising instructor. Student individualized research projects under faculty supervision. (S/U grading only.)

## **International Relations**

See Political Science, on page 519.

## **International Science Studies**

This interdisciplinary minor in International Science Studies will introduce College of Agricultural and Environmental Sciences students to global issues, which affect their major disciplines in the current world, and also provide an opportunity to gain first hand experience abroad when appropriate. The goal of this minor is to enable our college students to develop greater international competence and to enhance their employability.

The minor assumes that the student will have a major in the sciences, and that classes taken under one of the three tracks in the minor will contribute depth to the existing major or establish depth in a selected additional field of study. Students will be expected to work closely with an academic adviser in developing an intellectually coherent program of the study. A minimum of 18 units of upper division work is required. Only a single course can be counted toward both major and minor and no course can be used to satisfy the requirements of more than one minor.

### **Minor Program Requirements:**

	UNITS
<b>International Science Studies.....</b>	<b>24</b>
Global issue course requirement .....	7-8
Focusing on broad range of global issues and their impacts on ecological and environmental resources and biodiversity, in addition to international policy and economics. Beyond the courses taken under each track, choose two out of the three courses listed below:	
(1) Atmospheric Science 116	
(2) Plant Sciences 150	
(3) Agricultural and Resource Economics 115B	
Select one of the following tracks .....	16-17

Education Abroad Program courses taught overseas and relevant international internship activities will count towards the minor requirement with adviser's approval. For each track, students can take a maxi-

mum of three units from EAP courses, with a valid transcript, and three units from relevant international internship activities. The international internship activities would require a pre-approved study plan with the academic adviser before the maximum of three units can be awarded. Language and culture related courses are encouraged, but not required for the minor.

(1) *Ecological, environmental, and energy studies track:* Select 16-17 units from Anthropology 103, Agricultural and Resource Economics 147, Atmospheric Science 116, 133, Environmental Science and Management 100, 121, 131, 144, 120, 30, Environmental Science and Policy 100, 116, 151, Evolution and Ecology 147, Soil Science 109, Hydrology 143

(2) *Policy and management focus track:* Select 16-17 units from Agricultural and Resource Economics 115A/B, Agricultural and Resource Economics 138, International Relations 190, Community and Regional Development 156, 180, International Agricultural Development 160, 162, 170, Environmental Science and Policy 102, 175

(3) *Agriculture, food, and fiber systems track:* Select 16-17 units from Anthropology 103, 130, Atmospheric Science 133, Community and Regional Development 153A/B, Environmental Science and Management 121, 131, Evolution and Ecology 138, Hydrology 124, Plant Sciences 150, 160, Food Science and Technology 108, 109, Nutrition 119A/B, Textiles and Clothing 174

**Minor Adviser.** Shu-Hua Chen (*Land, Air and Water Resources*) 530-752-1822,  
[shachen@ucdavis.edu](mailto:shachen@ucdavis.edu)

## **Internship**

See Internship Program, below; and UC Washington Center (UCDC), on page 576.

## **Internship Program**

Marcie Kirk Holland, Director

The Internship and Career Center;  
2nd Floor, South Hall 530-752-2855  
<http://icc.ucdavis.edu>

### **Program Areas**

Agricultural and Environmental Sciences, Career Recruiting Programs, Engineering and Physical Sciences, Masters, Ph.D.s and Postdocs, Health and Biological Sciences, International Programs and Liberal Arts and Business.

### **Internship Experience**

The Internship and Career Center facilitates a campus-wide internship program. All internships, both credit and non-credit, can be taken for Transcript Notation with completion of required evaluation reports. The notation briefly describes the nature and location of the internship experience. Questions pertaining to Transcript Notation may be directed to The Internship and Career Center.

**Course Credit.** Internship courses (numbered 92 and 192) are available for credit on a variable-unit and Passed/Not Passed grading basis. A maximum of 12 units of 92 and/or 192 courses may be counted toward the 180-unit minimum needed for graduation. To qualify for the 192 course, students must have acquired 64 units of credit. All credited internships require approval and sponsorship by a faculty member from an appropriate discipline. Arrangements may be made through the department of the sponsoring faculty member and facilitated by The Internship and Career Center Staff.

## **Italian**

(College of Letters and Science)

Noah Guynn, Ph.D., Chairperson of the Department  
**Department Office.** 213 Sproul Hall  
530-752-1219; <http://italian.ucdavis.edu>

### **Faculty**

Margherita Heyer-Caput, Ph.D., Professor  
Juliana Schiesari, Ph.D., Professor  
(Comparative Literature, French and Italian)

### **Emeriti Faculty**

Antonella Bassi, M.A., Lecturer Emerita  
JoAnn Cannon, Ph.D., Professor Emerita  
Dennis Dutschke, Ph.D., Professor Emeritus  
Gustavo Foscarini, M.A., Senior Lecturer Emeritus

### **Affiliated Faculty**

Carmen Gomez, Ph.D., Lecturer  
Jay Grossi, M.A., Lecturer

### **The Major Program**

The major in Italian provides a solid language background that will enable the student to develop an appreciation for the numerous contributions Italians and Italophones have made to literature, the arts, political theory, science, and other expressions of human creativity. The major also emphasizes the influence Italian culture continues to have on our global world.

**The Program.** The Italian program is geared to the specific needs and interests of the students, who enjoy the advantages of a small classroom setting and the individualized mentoring of dedicated professors. While the use of Italian is stressed in language and literature courses, the program is interdisciplinary in nature. Starting at the lower-division level, students collaborate closely with academic advisers in order to design a major or minor curriculum that includes culture, film, art history, history, food science, and other courses in related fields offered on campus or in Italy. The Italian program actively participates in the UC-wide Education Abroad Program, the Quarter Abroad Program (Florence), the International Internships Program, and the Summer Sessions International (Rome), all of which offer opportunities for travel and study in Italy.

**Career Alternatives.** The Italian Program provides a solid foundation for a variety of career paths by offering training in Italian language and culture and developing skills that are vital in any professional setting: critical analysis, interpersonal skills, effective written and oral communication, and cultural sensitivity. In addition to specific career paths in foreign service and education, knowledge of the Italian language and culture enhances professional opportunities in a variety of fields, such as viticulture and enology, food science, political science, medicine, architecture, and engineering.

### **A.B. Major Requirements:**

UNITS

<b>Preparatory Subject Matter .....</b>	<b>0-27</b>
Italian 1, 2, 3, 4, 5, and 9 (or the equivalent) .....	0-27

<b>Depth Subject Matter .....</b>	<b>36</b>
-----------------------------------	-----------

Italian 101 and 105 .....	8
Seven additional courses in Italian, literature, cinema, and culture .....	28

Must include at least one course from two of the following literary periods (taught in Italian):	
--	--

(a) Early Italian Literature: Italian 112, 113, 114, 145, if applicable	
---	--

(b) Renaissance and Baroque Italian Literature: Italian 115A, 115B, 115C, 115D, 141, 145, if applicable	
---	--

(c) Modern and Contemporary Italian Literature: Italian 118, 119, 120A, 120B, 131, 142, 145, if applicable	
--	--

Upper division General Education courses in Italian may fulfill this requirement with approval of the major adviser.

The remaining five upper-division elective courses may include, but are not limited to, additional Italian literature or culture taught in Italian, Italian culture courses taught in English, and/or upper-division elective courses in related fields, such as Italian and Italian American Cinema (Italian 150, Italian/Film Studies 121, Film Studies 120), and other courses in Italian Studies taught in other departments and programs, subject to approval by the major adviser.

All upper division courses are to be chosen in consultation with the major adviser.

#### Total Units for the Major ..... 36-63

#### Recommended

Study abroad in Italy for a period of one year, one semester, or one quarter, and/or the study of Latin or another Romance language.

**Major Adviser.** M. Heyer-Caput

#### Minor Program Requirements:

##### UNITS

##### Italian ..... 20

Italian 101 and 105 ..... 8

Three additional upper division courses in Italian literature, cinema, and culture ..... 12

One course chosen from two of the following three areas:

- (a) Early Italian Literature: Italian 112, 113, 114, 145, if applicable
- (b) Renaissance and Baroque Italian Literature: Italian 115A, 150B, 150C, 150D, 141, 145, if applicable
- (c) Modern and Contemporary Italian Literature: Italian 118, 119, 120A, 120B, 131, 142, 145, if applicable).

The remaining two upper-division elective courses may include, but are not limited to, additional Italian literature or culture taught in Italian, such as Italian 104 and Italian 128, and Italian culture and film courses taught in English, such as Italian 150, Italian/Film Studies 121, Film Studies 120, subject to approval by the minor adviser.

**Minor Adviser.** M. Heyer-Caput

**Honors and Honors Program.** Candidates for high or highest honors in Italian must write a senior thesis under the direction of a faculty member. For this purpose, honors candidates must enroll in Italian 194H (3 units) and Italian 195H (3 units). Normally, a student will undertake the honors project during the first two quarters of the senior year; other arrangements must be authorized by the department chair. Only students who, at the end of the junior year (135 units), have attained a cumulative grade-point average of 3.500 in courses required for the major will be eligible for the honors program. The requirements for earning high and highest honors in Italian are in addition to the regular requirements for the major in Italian.

**Education Abroad Program.** The department of French and Italian strongly encourages students to study abroad in the Summer Abroad program (Rome), the Quarter Abroad Program (Florence), or the Education Abroad Program. Applicable courses are accepted for credit in the major or the minor programs.

**Teaching Credential Subject Representative.** See the Major Adviser above; see the Teaching Credential/M.A. Program on page 124.

**Prerequisite Credit.** Credit will not normally be given for a course if it is a prerequisite of a course already successfully completed. Exceptions can be made only by the major adviser.

**Quarter Abroad Program.** The UC Davis Quarter Abroad Program and the Italian Program offer an exciting Italian Language and Culture Program in Florence, Italy. While studying abroad in Florence, students will earn 23-28 UC Davis quarter units and

will experience the richness and vitality of Italian and European culture.

Participants fulfill three-quarters-worth of Italian language study, enroll in culture and film courses, integrate into the Florentine community through meaningful internships (with transcript notation), and explore electives in areas such as art history, photography, and food science.

There is no language requirement, and all registered UC Davis students with 2.000 GPA and above, good academic standing, and good disciplinary standing are eligible to apply.

For more information, please contact Professor Margherita Heyer-Caput at [mheyercaput@ucdavis.edu](mailto:mheyercaput@ucdavis.edu) or see <https://studyabroad.ucdavis.edu/programs/quarterabroad/italy.html>.

#### Courses in Italian (ITA)

#### Lower Division

Students offering high school language preparation as a prerequisite must take a placement test.

##### 1. Elementary Italian (5)

Discussion—5 hours; laboratory—1 hour. Introduction to Italian grammar and development of all language skills in a cultural context with special emphasis on communication. Students who have successfully completed Italian 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed. Not open for credit to students who have taken course 1A or 1S. GE credit: ArtHum | AH, WC.

##### 1A. Accelerated Intensive Elementary Italian (15)

Lecture/discussion—15 hours. Special 12-week accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Introduction to Italian grammar and development of all language skills in a cultural context with emphasis on communicative ability. Not open for credit to students who have completed courses 1, 2, or 3. Offered irregularly.

##### 1S. Elementary Italian (5)

Discussion—5 hours; laboratory—1 hour. Introduction to Italian grammar and development of all language skills in a cultural context with special emphasis on communication. Course is taught abroad. Students who have successfully completed Italian 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed. Not open for credit to students who have taken course 1 or 1A. GE credit: ArtHum | AH, WC. —F. (F.) Heyer-Caput

##### 2. Elementary Italian (5)

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1 or 1S. Continuation of course 1 or 1S. Review of grammar and vocabulary, and practice of all language skills through cultural texts. Not open for credit to students who have taken course 1A or 2S. GE credit: ArtHum | AH, WC.

##### 2S. Elementary Italian (5)

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1 or 1S. Continuation of course 1 or 1S. Review of grammar and vocabulary, and practice of all language skills through cultural texts. Course is taught abroad. Not open for credit to students who have completed course 1A or 2. GE credit: ArtHum | AH, WC. —F. (F.) Heyer-Caput

##### 3. Elementary Italian (5)

Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 2 or 2S. Continuation of course 2 or 2S. Review of grammar and vocabulary, and practice of all language skills through cultural texts. Not open for credit to students who have taken course 1A or 3S. GE credit: ArtHum | AH, WC.

#### 3S. Elementary Italian (5)

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2 or 2S. Continuation of course 2 or 2S. Review of grammar and vocabulary, and practice of all language skills through cultural texts. Course is taught abroad. Not open for credit to students who have taken course 1A or 3. GE credit: ArtHum | AH, WC. —F. (F.) Heyer-Caput

#### 4. Intermediate Italian (4)

Lecture/discussion—3 hours; laboratory—3 hours. Prerequisite: course 3 or 3S. Review of grammar and syntax through written exercises and short prose works. Intended to develop the linguistic foundations of students who have completed the first year language classes. GE credit: WC.

#### 4S. Intermediate Italian (4)

Lecture/discussion—3 hours; laboratory—3 hours. Prerequisite: course 3, 3S, or the equivalent. Review of grammar and syntax through written exercises and readings of short prose works. Intended to develop the linguistic foundations of students who have completed the first year language classes. This course is taught abroad. Not open for credit to students who have completed course 4. GE credit: WC. —F. S. (F. S.) Heyer-Caput

#### 5. Intermediate Italian (4)

Lecture/discussion—3 hours; laboratory—3 hours. Prerequisite: course 4 or 4S. Review and study of grammar and syntax, readings of short prose works, and written exercises. Intended to prepare students to read, understand, and discuss modern Italian. GE credit: WC.

#### 5S. Intermediate Italian (4)

Lecture/discussion—3 hours; laboratory—3 hours. Prerequisite: course 4 or 4S. Review and study of grammar and syntax, readings of short prose works, and written exercises. Intended to prepare students to read, understand, and discuss modern Italian. Course is taught abroad. Not open for credit to students who have completed course 5. GE credit: WC. —F. S. (F. S.) Heyer-Caput

#### 8A. Italian Conversation (3)

Discussion—3 hours. Prerequisite: course 3 or the equivalent. Course designed to offer practice in speaking Italian. May be repeated one time for credit. (P/NP grading only.) GE credit: WC. —F. S. (F. S.)

#### 8AS. Italian Conversation (3)

Discussion—3 hours. Prerequisite: course 3 or the equivalent. Practice in the speaking of Italian. Course is taught abroad. May be repeated for up to 6 units of credit. Not open for credit to students who have completed course 8. (P/NP grading only.) GE credit: WC.

#### 8B. Italian Conversation (3)

Discussion—3 hours. Prerequisite: course 8A. Course designed to offer practice in speaking Italian. (P/NP grading only.) GE credit: WC.

#### 8BS. Italian Conversation (3)

Discussion—3 hours. Prerequisite: course 8B. Practice in the speaking of Italian. Course is taught abroad. May be repeated for up to 6 units of credit. Not open for credit to students who have completed course 8B. (P/NP grading only.) —F. Heyer-Caput

#### 9. Reading Italian (4)

Lecture/discussion—3 hours; term paper. Prerequisite: course 5. Reading and discussion of modern Italian prose, including selections from creative, scientific and journalistic writings. Introduction to contemporary Italian literature and culture. Strengthening the student's command of the Italian language. GE credit: ArtHum | AH, WC.

#### 9S. Reading Italian (4)

Lecture/discussion—3 hours; term paper. Prerequisite: course 5 or 5S. Reading and discussion of modern Italian prose, including selections from creative, scientific and journalistic writings. Introduction to contemporary Italian literature and culture as well as strengthening the student's command of the Italian language. This course is taught abroad. Not open

for credit to students who have completed course 9. GE credit: ArtHum | AH, WC.—F, S. (F, S.) Heyer-Caput

### **50. Studies in Italian Cinema (4)**

Lecture—2 hours; discussion—1 hour; term paper. Lower division standing. Introduction to Italian cinema through its genres. Focus is on cinema as a reflection of and a comment on modern Italian history. Film will be studied as an artistic medium and as a form of mass communication. Offered irregularly. ArtHum, Wrt | AH, WC, WE.—Heyer-Caput

### **90X. Lower Division Seminar (1-2)**

Seminar—1-2 hours. Prerequisite: lower division standing and consent of instructor. Examination of a special topic in Italian language or culture (such as Italian culture seen through film, Italian feminism, literature, or politics) through shared readings, discussions, written assignments, or special activities such as film screening or laboratory work.

### **98. Directed Group Study (1-5)**

Prerequisite: lower division standing and consent of instructor. Primarily intended for lower division students. Offered irregularly. (P/NP grading only.)

## **Upper Division**

### **101. Advanced Conversation, Composition, and Grammar (4)**

Lecture—3 hours. Prerequisite: course 9 or 9S or consent of instructor or the equivalent. GE credit: ArtHum | AH, OL, WC, WE.—Heyer-Caput

### **101S. Advanced Composition, Conversation and Grammar (4)**

Lecture—3 hours; extensive writing. Prerequisite: course 9 or 9S or the equivalent. Instruction and practice in expository writing in Italian, with emphasis on advanced grammar, organization, and vocabulary building. Course will be taught in Italy. Not open for credit to students who have completed course 101. GE credit: ArtHum | AH, OL, WC, WE.—F. (F.) Heyer-Caput

### **104. Italian Translation and Style (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or 9S; consent of instructor. Practice in translation from Italian to English and English to Italian, using literary and non-literary texts of different styles. Analysis of linguistic problems and elements of style contained in the translation material. GE credit: AH, WC.—Gomez

### **104S. Translation and Style (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or 9S. Practice in translation from Italian to English and English to Italian, using literary and non-literary texts of different styles. Analysis of linguistic problems and elements of style contained in the translation material. Course will be taught abroad. Not open for credit to students who have completed course 104. GE credit: ArtHum | AH, WC.—F. (F.) Heyer-Caput

### **105. Introduction to Italian Literature (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or 9S; consent of instructor. Introduction to the study of the principal authors, works, and movements of the Medieval, Renaissance, and Early Modern periods in Italy. GE credit: ArtHum | AH, OL, WC.—Heyer-Caput

### **107. Survey of Italian Culture and Institutions (4)**

Lecture—3 hours; term paper. Assessment of the impact of regional autonomy on Italian cultural life from the Middle Ages to the present. Special emphasis will be placed upon achievements in literature, the arts, philosophy, and socio-political institutions. To be taught in English. GE credit: ArtHum or SocSci | AH, OL, SS, VL, WC, WE.—Grossi

### **107S. Survey of Italian Culture and Institutions (4)**

Lecture/discussion—3 hours; term paper. An assessment of the impact of regional autonomy on Italian cultural life from the Middle Ages to the present. Special emphasis will be placed upon achievements in literature, the arts, philosophy, and socio-political institutions. To be taught in English. Not open for

credit to students who have completed course 107. GE credit: ArtHum or SocSci | AH, OL, SS, VL, WC, WE.—S. (S.) Heyer-Caput

### **108. Contemporary Issues in Italian Culture and Society (4)**

Lecture/discussion—3 hours; term paper. Analysis of cultural issues in contemporary Italy: Myth and reality of imagined Italies; Italian identities; immigration and race relations; the media and popular culture. Taught in English. GE credit: ArtHum or SocSci, Div, Wrt | AH, OL, SS, VL, WC, WE.

### **108S. Contemporary Issues in Italian Culture and Society (4)**

Lecture/discussion—3 hours; term paper. Analysis of cultural issues in contemporary Italy; myth and reality of imagined Italies; Italian identities; immigration and race relations; the media and popular culture. Taught in English. This course will be taught abroad. Not open for credit to students who have completed course 108. GE credit: ArtHum or SocSci, Div, Wrt | AH, OL, SS, VL, WC, WE.—S. (S.) Heyer-Caput

### **112. Medieval and Renaissance Poetry: St. Francis to Petrarch (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or 9S or the equivalent; consent of instructor. Study of the origins of Italian religious and secular poetry of the 13th and 14th centuries. A diversified poetry is illustrated in works of St. Francis, Dante, Cavalcanti, Petrarch, the Sicilian School, the Sweet New Style Poets, and other authors. GE credit: ArtHum | AH, OL, WC, WE.

### **113. Dante Alighieri, *Divina Commedia (Inferno, Purgatorio, Paradiso)* (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or 9S or equivalent; consent of instructor. Study of Dante Alighieri's *Divina Commedia*, and its role in the development of Italian language and literature. Emphasis will be placed on reading the whole poem within the historical context of the Middle Ages. GE credit: ArtHum | AH, OL, WC, WE.

### **114. Boccaccio, *Decameron*, and the Renaissance Novella (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or 9S or the equivalent.; consent of instructor. Study of the development of the short story in Italy, as exemplified in Giovanni Boccaccio's *Decameron*, in his predecessors and Renaissance followers. GE credit: ArtHum | AH, OL, WC, WE.—Heyer-Caput

### **115A. Studies in the Cinquecento (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or 9S or consent of instructor or the equivalent. Analysis of key texts from the high moment of the Italian Renaissance. The political and aesthetic legacy of humanism will be foregrounded in relation to authors such as Ficino, Ariosto, Machiavelli, Ariosto, Castiglione, and Tasso. GE credit: ArtHum | AH, OL, WC.—Schiesari

### **115B. Italian Literature of the Renaissance and the Baroque: From Cellini to Marino (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 115A. Continued examination into the loss of an ideal. Emphasis on the conflicts in Michelangelo and Tasso leading to Marino, with an excursus on Galileo's role in the formation of a modern literary standard. GE credit: ArtHum | OL.—Schiesari

### **115C. Italian Drama from Machiavelli to the Enlightenment (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Development of comic and tragic forms as critical representations of their societal and historical contexts, i.e. Machiavelli and the logic of power, Baroque dramatists in the service of counter-reformation Italy, Goldoni's comedies and bourgeois social consciousness. GE credit: ArtHum | AH, OL, WC.

### **115D. Early Modern Italian Lyric (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or 9S or consent of instructor. Examination of the poetic tradition influenced by Petrarch.

Consideration of the relation between gender and genre in such poets as Petrarch, Bembo, della Casa, Tasso, Marino, Gaspara Stampa, Veronica Franco, Isabella di Morra. GE credit: ArtHum | AH, WC, WE.—Schiesari

### **118. Italian Literature of the Eighteenth Century (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or 9S or consent of instructor. Development of modern Italian literature. Emphasis on the work of Goldoni, Bettinelli, Baretti, Parini, Alfieri and Vico. GE credit: ArtHum | AH, OL.

### **119. Italian Literature of the Nineteenth Century (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or 9S or consent of instructor. Romanticism in Italy, including Manzoni, Verga, and Verismo. GE credit: ArtHum | AH, OL, WC, WE.—Heyer-Caput

### **120A. Italian Literature of the Twentieth Century: The Novel (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Development of the novel from Svevo to the present. Emphasis on the work of Svevo, Levi, Moravia, Pavese, and Vittorini. GE credit: ArtHum, Wrt | AH, WC, WE.—Heyer-Caput

### **120B. Italian Literature of the Twentieth Century: Poetry and Drama (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Italian poetry with emphasis on Hermeticism; the theater of Luigi Pirandello and its role in the development of contemporary Italian drama. GE credit: ArtHum | AH, WC, WE.—Heyer-Caput

### **121. New Italian Cinema (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 1 and upper-division standing, or consent of instructor. Italian cinema of the 21st century in the context of profound cultural and social changes in Italy since World War II. Productions by representative directors such as Amelio, Giordana, Moretti, Muccino are included. Knowledge of Italian not required. (Same course as Film Studies 121.) GE credit: ArtHum, Div, Wrt | AH, OL, VL, WC, WE.—Heyer-Caput

### **121S. New Italian Cinema (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 1 and upper-division standing, or consent of instructor. Italian cinema of the 21st century in the context of profound cultural and social changes in Italy since World War II. Productions by representative directors such as Amelio, Giordana, Moretti, Muccino are included. Knowledge of Italian not required. (Same course as Film Studies 121S.) GE credit: ArtHum, Div, Wrt | AH, OL, VL, WC, WE.—F. (F.) Heyer-Caput

### **122. Topics in Italian Culture (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 9 or 9S or consent of instructor. In-depth study of a particular topic in Italian Culture. Topics include: Italian Cities; Church and State; the "Southern Question"; Fascism and Resistance; 1968: Counter Culture, Feminism and Terrorism; Multicultural Italy. May be repeated one time for credit when topic differs. GE credit: ArtHum | AH, OL, WC, WE.—Bassi

### **131. Autobiography in Italy (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or 9S or consent of instructor. The development of representations of selfhood with particular attention to generic conditions, the confessional tradition and the problem of women's self-representation. Authors studied may include Petrarch, Tasso, Casanova, Alfieri, Zvezok, Sibilla Aleramo and Primo Levi. GE credit: ArtHum | AH, OL, WC, WE.—Heyer-Caput, Schiesari

### **139B. Italian Literature in English: Boccaccio, Petrarch and the Renaissance (4)**

Lecture/discussion—3 hours; term paper. Petrarch and Boccaccio and their relations to the Middle Ages and the Renaissance; the Renaissance, with

particular attention to the works of Lorenzo de' Medici, Leonardo da Vinci, Machiavelli, Ariosto, Michelangelo, and Tasso. GE credit: ArtHum | AH, OL, WC, WE.

#### **140. Italian Literature in English**

##### **Translation: Dante, Divine Comedy (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: any course from the GE Literature Preparation List. Reading of Dante Alighieri's Divine Comedy, through the otherworld realms of Inferno, Purgatory, and Paradise. GE credit: ArtHum, Wrt | AH, OL, WC, WE.

#### **141. Gender and Interpretation in the Renaissance (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: completion of entry level writing requirement. Critical analysis of Renaissance texts with primary focus on issues such as human dignity, education and gender politics; "high" and "low" culture and its relation to literary practices. (Same course as Comparative Literature 138.) GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Schiesari

#### **142. Masterpieces of Modern Italian Narrative (4)**

Lecture—1.5 hours; discussion—1.5 hours; term paper. Prerequisite: either English 3, Comparative Literature 2, or History 4C. Analysis of major works of Italian narrative fiction from unification of Italy to present. Students will learn to use representative methods and concepts which guide literary scholarship. Consideration of works within European social and cultural context. Offered in alternate years. GE credit: ArtHum, Wrt | AH, WC, WE.—Heyer-Caput

#### **145. Special Topics in Italian Literature (4)**

Lecture/discussion—4 hours. Prerequisite: course 9 or 9S or consent of instructor. Study of special topics and themes in Italian literature, such as comic literature, epic poetry, pre-twentieth century theater, fascism, futurism, women and literature, and the image of America, etc. May be repeated for credit when topic differs. GE credit: ArtHum, Wrt | AH, OL, VL, WC, WE.

#### **145S. Special Topics in Italian Literature (4)**

Lecture/discussion—4 hours. Prerequisite: course 9 or 9S or consent of instructor. Study of special topics and themes in Italian literature, such as comic literature, epic poetry, pre-twentieth-century theater, fascism, futurism, women and literature, the image of America, etc. Course is taught abroad. May be repeated for credit. Not open for credit to students who have completed course 145. GE credit: ArtHum, Wrt | AH, OL, VL, WC, WE.—F. (F.)

#### **150. Studies in Italian Cinema (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: consent of instructor. Introduction to Italian cinema through its genres. Focus on cinema as a reflection or a comment on modern Italian history. Film as an artistic medium and as a form of mass communication. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.—Heyer-Caput

#### **190X. Upper Division Seminar (1-2)**

Seminar—1-2 hours. Prerequisite: upper division standing and consent of instructor. Limited enrollment. Examination of a special topic in Italian language or culture through shared readings, discussions, written assignments or special activities such as film screening or laboratory work. May not be repeated for credit. GE credit: ArtHum | AH, WC, WE.

#### **192. Italian Internship (1-12)**

Internship—3-36 hours. Prerequisite: upper division standing and consent of chairperson of Italian Department. Participation in government and business activities to gain work experience and to develop a better knowledge of Italian language and culture. (P/NP grading only.)

#### **192S. Italian Internship (1-12)**

Internship—3-36 hours. Prerequisite: upper division standing, consent of instructor and UC Davis program director or chairperson of Italian Department. Participation in community service, teaching, government, and business activities to gain work experi-

ence and to develop a better knowledge of Italian language and culture. This course is offered abroad. (P/NP grading only.)—Heyer-Caput

#### **194H. Special Study for Honors Students (3)**

Independent study—3 hours. Prerequisite: open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in Italian literature, civilization, or language studies. (P/NP grading only.) GE credit: AH, WC.

#### **195H. Honors Thesis (3)**

Independent study—3 hours. Prerequisite: course 194H. Writing of an honors thesis on a topic in Italian literature, civilization, or language studies under the direction of a faculty member. (P/NP grading only.) GE credit: AH, WC, WE.

#### **197T. Tutoring in Italian (1-4)**

Seminar—1-2 hours; laboratory—1-2 hours. Prerequisite: upper division standing and consent of instructor. Tutoring in undergraduate courses, including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit for a total of 6 units. (P/NP grading only.)

#### **197TC. Community Tutoring in Italian (1-5)**

Discussion—1-2 hours; laboratory—2-4 hours. Prerequisite: consent of instructor. Field experience as Italian tutors or teacher's aides. May be repeated for credit for a total of 10 units. (P/NP grading only.)

#### **198. Directed Group Study (1-4)**

Prerequisite: consent of instructor. (P/NP grading only.)

#### **198S. Directed Group Study (1-4)**

Prerequisite: consent of instructor. Group study on focused topics in Italian literature and culture. Varies according to instructor. This course is offered abroad. May be repeated for credit when topic differs. (P/NP grading only.)—Heyer-Caput

#### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

#### **199S. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. Opportunity for a faculty member to work with an advanced undergraduate student in a focused manner on a topic or topics of mutual research/creative interest. This course is offered abroad. May be repeated for credit when topic differs. (P/NP grading only.)—Heyer-Caput

#### **Graduate**

#### **297. Individual Study (1-5)**

Prerequisite: graduate standing or consent of instructor.

#### **298. Group Study (1-5)**

Prerequisite: graduate standing or consent of instructor.

#### **299. Research (1-12)**

Prerequisite: graduate standing or consent of instructor. (S/U grading only.)

#### **299D. Dissertation Research (1-12)**

Prerequisite: graduate standing or consent of instructor. (S/U grading only.)

#### **Professional**

#### **396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## **Japanese**

See **East Asian Languages and Cultures**, on page 244.

## **Jewish Studies**

(College of Letters and Science)

Diane L. Wolf, Ph.D., Program Director

**Program Office.** 2216 Social Sciences and Humanities Building

<http://jewishstudies.ucdavis.edu>

#### **Committee in Charge**

David Biale, Ph.D. (*History*)

Jenny Kaminer, Ph.D. (*German and Russian*)

Zeev Maoz, Ph.D. (*Political Science*)

Sven-Erik Rose, Ph.D. (*German*)

Diane Wolf, Ph.D. (*Sociology*)

#### **The Program of Study**

The Program in Jewish Studies offers students the opportunity to explore Jewish history, communities, literature, religion, and culture in a comparative perspective and multicultural framework. Courses include Hebrew language instruction as well as the study of classical and modern Jewish texts in translation.

The interdisciplinary minor in Jewish Studies provides an introduction to the study of Jewish culture, thought, history, and literature. Students learn a broad range of methodologies and critical concepts in these areas and gain insight into the relation between Jewish identities, histories, and representations and those of the cultures in which Jews throughout the world have lived.

The Program in Jewish Studies will be of special interest to students in History, Religious Studies, Comparative Literature and Sociology as well as other fields in the Humanities and Social Sciences.

#### **Minor Program Requirements:**

UNITS

**Jewish Studies ..... 20**

One course from: Jewish Studies 10 or Religious Studies 21 or 23 .....	4
Four upper division courses selected from:	
Comparative Literature 147, English 171A, German 116, 117, 141, Hebrew 100A, 100B, 100C, History 112A, 112B, 112C, 113, 142A, 142B, Jewish Studies 101, 110, 111, 112, 120, 121, Political Science 135, 136, Sociology 174.....	16

**Advising.** Jewish Studies Program office; 530-754-7007; [jst@ucdavis.edu](mailto:jst@ucdavis.edu).

#### **Courses in Jewish Studies (JST)**

##### **Lower Division**

###### **10. Introduction to Jewish Cultures (4)**

Lecture—3 hours; term paper. Diverse Jewish cultures created over the past 2,000 years using examples from less-familiar communities such as India, China, and Ethiopia. Topics include the tensions between homeland/diaspora and questions of identity (race, nationality, culture, or religion). Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WC, WE.

##### **Upper Division**

###### **101. Topics in Jewish Thought (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 10 or Religious Studies 23 or consent of instructor. Selected themes in Jewish thought in historical and social perspective. This course traces the historical development of topics in Jewish thought such as Messianism, or focuses on one specific historical period, such as modern Jewish thought. May be repeated for credit when topic differs. Offered irregularly. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—W. (W.)

###### **110. Selected Topics in Jewish Literature (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: one lower division literature or Jewish Studies course or consent of instructor. Literature written about the Jewish experience, treated in its historical and social context. Examines literature written in one

language, such as English, Hebrew, or Yiddish, or a theme, such as gender or modern identities, as expressed in different literary traditions. May be repeated for credit when topic differs. Offered irregularly. GE credit: ArtHum, Div, Wrt | AH, WC, WE. –W. (W.)

### 111. Israeli Writing Since 1960 (4)

Lecture/laboratory—3 hours; extensive writing. Prerequisite: one course in American or European literature. Contemporary Hebrew literature, in translation, in relation to post-independence debates about religious, social, and political identity of the Jewish state; literary reflections of Israeli ethnic diversity and changing gender relations; modern Hebrew poetry and postmodern experiments in fiction. Not open for credit to students who have completed Humanities 119. Offered irregularly. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

### 112. Readings in Jewish Writing and Thought in German Culture (4)

Lecture/discussion—3 hours; term paper. Prerequisite: Religious Studies 23 or consent of instructor. Historical tradition of Jewish thought in the German cultural context; unique contributions of Jewish writers to culture of the German speaking world; what it means to be "other" in the mainstream culture. May be repeated for credit twice when topic differs. Not open for credit to students who have completed Humanities 119. Offered irregularly. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

### 116. Readings in Jewish Writing and Thought in German Culture (4)

Lecture—3 hours; term paper. Prerequisite: Religious Studies 23 or consent of instructor. Historical tradition of Jewish thought in the German cultural context; unique contributions of Jewish writers to culture of the German-speaking world; what it means to be "other" in the mainstream culture. No credit will be given to those students who have completed Humanities 121. May be repeated two times for credit if topic differs. Offered irregularly. (Same course as German 116.) GE credit: GE credit: ArtHum, Div, Wrt | AH, OL, WC, WE.

### 120. Cinema and the American Jewish Experience (4)

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 10 recommended. Examination of American cinema to reveal how Jewish identity is expressed and submerged, tracing the relations between religion, identity, race, politics, and art. Not open for credit to students who have completed Humanities 122. Offered irregularly. GE credit: ArtHum, Div, Wrt | AH, WE.

### 121. Oral History and Jewish Life (4)

Lecture/discussion—3 hours; term paper. Oral history methodologies and application to an in-depth oral history interview about Jewish life. Topics include oral history practices and ethics, immigration, migration, religious practice, ethnic relations, and community organization structures. Not open for credit to students who have completed Humanities 123. Offered irregularly. GE credit: SocSci, Wrt | SS.

## Land, Air and Water Resources

(College of Agricultural and Environmental Sciences)

Randy Southard, Chairperson

**Department Office.** 1110 Plant and Environmental Sciences Building 530-752-1130;  
<http://lawr.ucdavis.edu>

### Faculty—Soils and Biogeochemistry

**Office.** 1110 Plant and Environmental Sciences Building 530-752-1130

Randy Dahlgren, Ph.D., Professor  
(*Soil Biogeochemistry*) Academic Senate Distinguished Teaching Award

Rebecca Renee Hernandez, Ph.D., Assistant Professor

William R. Horwath, Ph.D., Professor  
(*Soil Biogeochemistry*)

Benjamin Z. Houlton, Ph.D., Associate Professor (*Biogeochemistry*)

Louise Jackson, Ph.D., Professor and Specialist in Cooperative Extension (*Soil Science*)

Alexandra Navotsky, Ph.D., Professor  
(*Chemical Engineering and Materials Science, Land, Air and Water Resources*)

Sanjai Parikh, Ph.D., Associate Professor (*Soils and Biogeochemistry*)

Jorge Rodrigues, Ph.D., Associate Professor

Kate M. Scow, Ph.D., Professor (*Soil Science*)

Randal J. Southard, Ph.D., Professor  
(*Soil Genesis/Morphology*)

Paul Ullrich, Ph.D., Asst. Professor (*Atmospheric Science/Climate and Global Change*)

### Emeriti Faculty

Conrad J. Bahre, Ph.D., Professor Emeritus

Caroline S. Bledsoe, Ph.D., Professor Emeritus

Richard G. Bureau, Ph.D., Professor Emeritus

Emanuel Epstein, Ph.D., Professor Emeritus

Robert G. Floccihini, Ph.D., Professor Emeritus

André E. Läuchli, Ph.D., Professor Emeritus

Roland D. Meyer, Ph.D., Specialist in Cooperative Extension Emeritus

H. Michael Reisenauer, Ph.D., Professor Emeritus

James H. Richards, Ph.D., Professor Emeritus

Dennis E. Rolston, Ph.D., Professor Emeritus

Wendy K. Silk, Ph.D., Professor Emerita

(*Hydrologic Science*)

Michael J. Singer, Ph.D., Professor Emeritus

Harry O. Walker, Ed.D., Senior Lecturer Emeritus

Robert J. Zasoski, Ph.D., Professor Emeritus

**Affiliated Faculty**

Daniel Geisseler, Ph.D., Assistant Specialist in Cooperative Extension

A. Toby O'Geen, Ph.D., Specialist in Cooperative Extension

### Faculty—Atmospheric Science

Cort Anastasio, Vice Chairperson

**Office.** 1110 Plant and Environmental Sciences Building 530-752-1130

Cort Anastasio, Ph.D., Professor

(*Tropospheric Chemistry*)

Shu-hua Chen, Ph.D., Associate Professor (*Regional Scale Meteorologist*)

Ian Falloon, Ph.D., Associate Professor (*Atmospheric Science*)

Richard D. Grotjahn, Ph.D., Professor (*Atmospheric Science*)

Terrence R. Nathan, Ph.D., Professor (*Atmospheric Science*)

Kyaw Tha Paw U, Ph.D., Professor (*Atmospheric Science*)

Anthony S. Wexler, Ph.D., Professor (*Mechanical and Aerospace Engineering, Civil and Environmental Engineering, Land, Air and Water Resources*)

### Emeriti Faculty

Thomas A. Cahill, Ph.D., Professor Emeritus

John J. Carroll, III, Ph.D., Professor Emeritus

G. Stuart Pettygrove, Professor Emeritus

Ruth Reck, Ph.D., Professor Emeritus

Roger H. Shaw, Ph.D., Professor Emeritus

Marilyn L. Shelton, Ph.D., Professor Emeritus

Richard L. Snyder, Ph.D., Specialist in Cooperative Extension Emeritus

### Affiliated Faculty

Travis O'Brien, Ph.D., Assistant Adjunct Professor

## Land, Air and Water Resources

### Faculty—Hydrology

Susan Ustin, Vice Chairperson

**Office.** 1110 Plant and Environmental Sciences 530-752-1130

Helen Dahlke, Ph.D., Assistant Professor (*Integrated Hydrologic Sciences/Hydrologic Modeler*)

Graham E. Fogg, Ph.D., Professor (*Hydrogeology*)

Mark E. Grismer, Ph.D., Professor (*Hydrologic Science, Biological and Agricultural Engineering*)

Peter J. Hernes, Ph.D., Professor (*Hydrologic Science*)

Jan W. Hopmans, Ph.D., Professor (*Vadose Zone Hydrology*)

Yufang Jin, Ph.D., Assistant Professor

Gregory B. Pasternack, Ph.D., Professor (*Watershed Hydrology*)

Carlos E. Puente, Ph.D., Professor (*Hydrology*)

Samuel Sandoval Solis, Ph.D., Assistant Professor (*Hydrologic Sciences/CE Specialist in Water Management*)

Susan Ustin, Ph.D., Professor (*Environmental and Resource Sciences*)

### Emeriti Faculty

David A. Goldhamer, Ph.D., Lecturer Emeritus

Donald W. Grimes, Ph.D., Lecturer Emeritus

Theodore C. Hsiao, Ph.D., Professor Emeritus

Allen W. Knight, Ph.D., Professor Emeritus

Miguel A. Mariño, Ph.D., Professor Emeritus

Donald R. Nielsen, Ph.D., Professor Emeritus

Frank E. Robinson, Ph.D., Lecturer Emeritus

Lawrence J. Schwankl, Ph.D., Specialist in Cooperative Extension Emeritus

Verne H. Scott, Ph.D., Professor Emeritus

Wesley W. Wallender, Ph.D., Professor Emeritus

### Affiliated Faculty

Stephen Grattan, Ph.D., Lecturer (*Hydrologic Science*) and Specialist in Cooperative Extension

Thomas Harter, Ph.D., Specialist in Cooperative Extension

Doug Mackay, Ph.D., Adjunct Professor (*Hydrologic Science*)

Daniele Zaccaria, Ph.D., Assistant Specialist in Cooperative Extension (*Hydrologic Sciences*)

Minghua Zhang, Ph.D., Adjunct Professor (*Hydrologic Science*)

Land, Air and Water Resources is a multidisciplinary department with faculty who specialize in atmospheric, plant, environmental resource, soil, hydrology, and water engineering. Teaching and research focus on both agricultural forestry, natural ecosystems, climate change and environmental science. The faculty contribute to numerous other undergraduate and graduate programs in the Colleges of Letters and Science, Engineering, and Agricultural and Environmental Sciences.

**Major Programs.** Undergraduates in the department major in Atmospheric Science, Environmental and Resources Sciences, Environmental Science and Management, and Hydrology, and Soil and Water Science; see [http://lawr.ucdavis.edu/academic\\_programs.htm](http://lawr.ucdavis.edu/academic_programs.htm).

**Undergraduate Advising Center** is located in 1150 Plant and Environmental Sciences Building 530-752-1603.

**Staff Adviser.** Lacole Brooks [lbrooks@ucdavis.edu](mailto:lbrooks@ucdavis.edu) 530-752-1603.

**Graduate Study.** Graduate work is offered in the area of Atmospheric Science, Hydrologic Sciences, and Soils and Biogeochemistry. For detailed information, call 530-752-1669 or see [http://lawr.ucdavis.edu/academic\\_programs.htm](http://lawr.ucdavis.edu/academic_programs.htm).

**Courses.** See courses listed under Atmospheric Science, Hydrologic Sciences, Hydrology, Environmental and Resource Sciences, Environmental Science and Management, and Soil Science. See also the websites listed above.

# Landscape Architecture

College of Agricultural and Environmental Sciences  
(Department of Human Ecology)

Steven E. Greco, Chairperson, Landscape Architecture and Environmental Design Program

**Program Office.** 131 Hunt Hall  
530-752-3907;  
<http://humaneology.ucdavis.edu/lda>

## Faculty

Elizabeth Boult, M.L.A., Continuing Lecturer  
David de la Pena, Ph.D., Assistant Professor  
Steven E. Greco, Ph.D., Professor  
Eric Larsen, Ph.D., Associate Research Scientist  
Jeff Loux, Ph.D., Associate Adjunct Professor  
Brett Milligan, M.L.A., Assistant Professor  
N. Claire Napawan, M.L.A., Assistant Professor  
Lorence Oki, Ph.D., Associate Specialist in Cooperative Extension  
Patsy Eubanks Owens, M.L.A., Professor  
Michael Rios, Ph.D., Associate Professor  
Sheryl-Anne Simpson, Ph.D., Assistant Professor  
Stephen Wheeler, Ph.D., Professor

## Emeriti Faculty

Mark Francis, M.L.A., Professor Emeritus  
Dean MacCannell, Ph.D., Professor Emeritus  
Heath Massey, M.F.A., Professor Emerita  
E. Byron McCulley, B.S.L.A., Continuing Lecturer Emeritus  
Edward S. McNeil, M.L.A., Senior Lecturer, SOE Emeritus  
Robert L. Thayer, Jr., M.A., Professor Emeritus

## The Major Program

Landscape architecture is the planning and design of land areas where human use requires adaptation or conservation of the environment. Students who study landscape architecture are concerned about the welfare of the environment and the people who use and shape it. They are capable of solving physical problems and are able to visualize and think in terms of spaces and three-dimensional concepts. The program is fully accredited by the Landscape Architecture Accreditation Board (LAAB) which is the only organization professionally sanctioned to grant landscape architectural accreditations in the United States. The program was last reviewed in 2012.

**The Program.** The curriculum balances creativity and visual and spatial skills with technological expertise and a thorough background in physical, natural, and social sciences. Students develop proficiency at problem solving relating to design of parks, public spaces, energy-efficient neighborhoods, land reclamation projects, city and regional planning, and landscape planning for wilderness and scenic regions, coastal and riparian environments, and other sensitive land areas. The program stresses a process-oriented approach to design and emphasizes environmental and community values.

**Preparatory Requirements.** Students are admitted to the landscape architecture major only after submitting a portfolio for review and selection by the faculty. Contact the Landscape Architecture Advising Office for further information in 135 Hunt Hall 530-754-8628.

**Career Alternatives.** Graduates may find jobs in private landscape architectural firms or public agencies, non-profit organizations, and corporations employing landscape architects. The landscape architecture major provides the student with excellent preparation for graduate school or career development in a wide range of environmental and design-related fields.

## B.S. Major Requirements:

	UNITS
<b>Preparatory Subject Matter .....</b>	<b>76-79</b>
English Writing .....	4

Communication 1 .....	4
Biological Sciences 2A, 2B .....	10
Environmental Horticulture 6 .....	4
One course from: Mathematics 16A; Statistics 13; Computer Science 10 .....	3-4
One course from: Chemistry 2A, 10; Physics 1A, 10; Geology 1; Geography 1; or Soil Science 10 .....	3-5
Two courses satisfying Social Sciences general education requirement.....	8
Two courses satisfying Arts and Humanities general education requirement.....	8
Landscape Architecture 1, 2, 3, 21, 30, 50, 60, 70.....	32

### Depth Subject Matter ..... 56

Landscape Architecture 160, 161, 170, 171 .....	22
Three studios from Landscape Architecture 191 (3 courses-5 units each).....	15
Landscape Architecture 120 or 150 .....	4
Landscape Architecture 190 (three quarters) .....	3
Landscape Architecture 102 .....	4
Environmental Horticulture 133, 105 .....	8

### Restricted Electives..... 20

Select 20 units of upper division courses in consultation with adviser .....

### Total Units for the Major ..... 158

**Major Adviser.** Nina Claire Napawan

**Advising Center.** See Sharla Cheney, 135 Hunt Hall, 530-754-8628, [scheney@ucdavis.edu](mailto:scheney@ucdavis.edu)

**Graduate Study.** Graduate-level landscape architecture courses are available to students pursuing graduate programs compatible with or directed toward landscape management, planning, and design issues. A Graduate Academic Certificate in Landscape Architecture and Environmental Design is an option for any graduate student; see <https://gradstudies.ucdavis.edu/programs/graduate-academic-certificates>. Program faculty are active members of various graduate groups: Community Development, Geography, Transportation Technology and Policy, and Ecology. Faculty members have expertise in many areas, including landscape history, social theory, practice of public space design, historic landscape preservation, city and regional planning, community participation in urban landscape design, landscape ecology, conservation planning, resource management, bioregionalism, and regenerative landscape systems. Graduate students pursue more focused interests, expanding their professional expertise and/or conducting advanced research in landscape architecture or related disciplines.

## Courses in Landscape Architecture (LDA)

### Lower Division

#### 1. Introduction to Environmental Design (4)

Lecture—3 hours; discussion—1 hour; term paper. Introduction to the role of design professionals in contributing to the built environment at a range of scales. Introduction to basic methods used by design professionals to evaluate, design, plan, and manage landscapes and the built environment. Not open for credit to students who have taken course 40. GE credit: ArtHum or SciEng or SocSci, Wrt | AH or SE or SS, VL, WC, WE.—F. (F.) Napawan

#### 2. Place, Culture and Community (4)

Lecture—4 hours. Introduction to recognizing and reading cultural landscapes, and the application of cultural landscape meaning to the creation of contemporary built environments. Topics include patterns and influences relating to agriculture, military, transportation, housing, wilderness, recreation and tourism. GE credit: SocSci, Wrt | ACGH, SS, VL, WC, WE.—W. (W.) Owens

#### 3. Sustainable Development: Theory and Practice (4)

Lecture—2 hours; extensive problem solving—2 hours, discussion—1 hour. Origins, theoretical perspectives, and practical applications of the concept

of sustainable development at a number of scales (site, building, neighborhood, city, region, and nation) through lectures, sketch exercises, student projects, walking tours. GE credit: SocSci, Wrt | ACGH, SS, VL, WE.—S. (S.) Wheeler

### 10. World Regional Geography (3)

Lecture—3 hours. Major geographic regions of the world; physical and human geography of each region; interactions between the people and the environment; culture and landscape; major resources; physical environments; population distribution and major cities. GE credit: AH or SS, WC.—S. (S.)

### 21. Environmental Design Visualization (5)

Lecture—3 hours; laboratory/discussion—3 hours. Prerequisite: course 1; can be taken concurrently with course 1. Pass One is restricted to Pre-Landscape Architecture and Sustainable Environmental Design majors. Idea expression through graphic media and drawing techniques for visual representation of the built environment, including conventional drafting and expressive techniques. Introduction to computerized graphics techniques. GE credit: ArtHum | AH, OL, VL.—F. (F.) Boult

### 23. Computer Graphics for Landscape Architecture (4)

Studio—8 hours; two all-day field trips. Prerequisite: course 21. Restricted to Pre-Landscape Architecture and Landscape Architecture majors only. Landscape architectural communications explored through the computer. Includes computerized drafting, drawing, rendering, desktop publishing, and photorealistic simulation.—F. (F.)

### 30. History of Environmental Design (4)

Lecture—3 hours; discussion—1 hour. History of Environmental Design across disciplines, including landscape architecture, planning, community and urban design. GE credit: ArtHum, Wrt | AH, VL, WE.—W. (W.) Boult

### 50. Site Ecology (4)

Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 2B. Pass One restricted to Pre-Landscape Architecture and Sustainable Environmental Design majors. Introduction to ecological concepts, including nutrient dynamics, population regulation, community structure, ecosystem function. Principles will be applied to human activities such as biological conservation, ecological restoration, landscape planning, and management. Weekly laboratory devoted to field exercises in local ecosystems. GE credit: SciEng | SE, VL, WE.—S. (S.) Greco

### 60. Landform and Grading Studio (6)

Studio—8 hours; extensive problem solving. Prerequisite: course 70. Pass One restricted to Pre-Landscape Architecture majors. Introduction of landform and topography as landscape medium and utilization of grading and drainage to design meaningful and functional spaces. Introduction to site analysis, site planning, and the conventions of grading & drainage, including contour manipulation and physical model building. GE credit: ArtHum or SciEng | AH or SE, OL, VL.—S. (S.) Napawan

### 61. AutoCAD for Landscape Architects (4)

Lecture—2 hours; laboratory—4 hours. Pass One restricted to Pre-Landscape Architecture, Sustainable Environmental Design, and Landscape Architecture majors. Introduction of computer-aided drafting (CAD) techniques and their application to landscape design. Drawing set-up, layer control, basic drawing and editing commands, dimensioning and text styles, symbol libraries, and display commands used in the creation of landscape architectural drawings. Offered irregularly.

### 70. Introduction to Spacemaking (5)

Lecture—3 hours; laboratory/discussion—3 hours. Prerequisite: course 21. Pass One restricted to Pre-Landscape Architecture and Sustainable Environmental Design majors. Introduction to basic principles of design towards the creation of space. Introduction to design methodologies and skills necessary to define, manipulate, and represent the built environment. Workshops in 2D computer graphic techniques and

**Fall 2011 and on Revised General Education (GE): AH=Arts and Humanities; SE=Science and Engineering; SS=Social Sciences;**

**ACGH=American Cultures; DD=Domestic Diversity; OL=Oral Skills; QL=Quantitative; SL=Scientific; VL=Visual; WC=World Cultures; WE=Writing Experience**

**Pre-Fall 2011 General Education (GE): ArtHum=Arts and Humanities; SciEng=Science and Engineering; SocSci=Social Sciences; Div=Domestic Diversity; Wrt=Writing Experience**

**Quarter Offered: F=Fall, W=Winter, S=Spring, Su=Summer; 2017-2018 offering in parentheses**

3D physical modeling making will reinforce design principles. GE credit: ArtHum | AH, OL, VL.—W. (W.) Napawan

### **98. Directed Group Study in Landscape Architecture (1-5)**

Prerequisite: consent of instructor. Directed group study. (P/NP grading only.)

### **99. Special Study for Undergraduates in Landscape Architecture (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

## **Upper Division**

### **102. Methods in Design and Landscape Research (4)**

Seminar—4 hours; term paper. Prerequisite: course 171. Restricted to Landscape Architecture majors. Research, design, and planning methods employed in landscape architecture. Exercises allow students to design independent landscape research. Lectures provide a historical overview of research methodology. GE credit: ArtHum | AH, OL, VL, WE.—W. (W.)

### **120. Advanced Computer Applications (4)**

Studio—8 hours; two all-day field trips. Restricted to Landscape Architecture majors. Studio work using computer-aided design, geographic information systems, and other advanced computer programs.—W. (W.) Milligan

### **140. Green Building, Design, and Materials (4)**

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 50, 70. Pass One restricted to Sustainable Environmental Design majors. Sustainable design and construction techniques at site and building scales. Emphasizes real-world case studies, analysis of opportunities for actual sites, and application of LEED and Sustainable Sites green rating systems. GE credit: ArtHum or SciEng | AH or SE, VL.—F. (F.) Milligan

### **141. Community Participation and Design (4)**

Lecture—1 hours; laboratory—3 hours; fieldwork—3 hours; project—3 hours. Prerequisite: course 21, 30, 50, 70. Restricted to Sustainable Environmental Design and Landscape Architecture majors. Introduction to community participation and design. Incorporates social and cultural factors, public and community processes, theories and practices related to human-environment behavior; community involvement in design, social analysis, community engagement, accessibility, diversity and politics of place. GE credit: ArtHum or SocSci | ACGH, AH or SS, DD, VL.—W. (W.) Simpson

### **142. Applying Sustainable Strategies (4)**

Lecture—3 hours; laboratory—3 hours; extensive problem solving. Prerequisite: course 140, 141. Restricted to Sustainable Environmental Design Majors. Capstone class examines case studies and techniques of sustainable development. Student teams will develop detailed proposals for real-world sites. GE credit: ArtHum or SciEng or SocSci | AH or SE or SS, OL, VL, WE.—S. (S.)

### **150. Introduction to Geographic Information Systems (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Plant Sciences 21 or equivalent with consent of instructor. Priority given to College of Agricultural and Environmental Science majors. Basic concepts, principles, and methods of GIS are presented. Data structures, database design, GIS data creation, GPS, and spatial analysis techniques are emphasized. Lab topics include: online data sources, aerial photography, GPS data input, suitability analysis, cartographic design, and graphic communication. Not open for credit to students who have completed Applied Biological Systems Technology 180/Plant Sciences 180 or Applied Biological Systems Technology 181N. (Same course as Applied Biological Systems Technology 150.) GE credit: SciEng | SE, VL.—F. (F.) Greco, Upadhyaya

### **160. Design and Build Studio (6)**

Studio—8 hours; extensive problem solving; fieldwork. Prerequisite: course 1, 2, 3, 21, 30, 50, 70. Restricted to Landscape Architecture majors. Introduction to the spatial design and construction of small-scale projects. Hands-on approach to learning and understanding materials (including wood, concrete, and stone) and methods in landscape construction, and the application of technical skills (including detailing, cost estimation, and specifications). GE credit: ArtHum or SciEng | AH, OL, VL.—F. (F.)

### **161. Technology 3: Professional Practice and Construction Documents (4)**

Studio—8 hours. Prerequisite: course 171. Open to Landscape Architecture majors only. Legal and professional aspects of landscape architecture, including the development of construction documents (drawings and specifications), proposal writing, fee calculations, project management, cost estimation, and insurance.—F. (F.)

### **170. Site Planning and Design Studio (6)**

Studio—8 hours. Prerequisite: course 160. Open to Landscape Architecture majors. Application of placemaking and problem-solving skills to local landscape sites. Analysis of social and environmental conditions in the field. Lectures link design projects to contemporary theories and practices. Includes workshops in computer-aided drafting. GE credit: ArtHum | AH, OL, VL.—W. (W.) de la Pena

### **171. Urban Design and Planning Studio (6)**

Studio—8 hours. Prerequisite: course 170. Restricted to Landscape Architecture majors. Studio designing large-scale landscapes at regional, sub-regional, and neighborhood scales. Focuses on understanding complex social, economic, and environmental factors, developing sustainability priorities and strategies, and applying them through design and policy. GE credit: ArtHum | ACGH, AH, OL, VL.—S. (S.)

### **180. Advanced Design and Planning Studio (6)**

Studio—8 hours; fieldwork; extensive problem solving. Prerequisite: course 60, 160, 170, 171, 172. Restricted to Landscape Architecture majors or consent of instructor. Application of advanced theories and methods of design and planning to real-world projects. May be repeated for up to 18 units of credit. GE credit: ArtHum or SciEng | AH, OL, VL.

### **180A. Special Topics in Landscape Architecture: Postmodern Landscapes (2)**

Lecture—2 hours. Prerequisite: upper division standing. Basic principles of critical theory and postmodern modes of analysis. Application to interpretation and change of designed environment. Not open for credit to students who have taken course 185. Offered in alternate years.

### **180C. Special Topics in Landscape Architecture: Art of the Environment (2)**

Lecture—2 hours. Prerequisite: courses 1 and 30. Priority given to Landscape Architecture and Design majors. Introduction to environmental art. Encouragement of critical thinking about the intersection of art, landscape and environmental issues.

### **180F. Special Topics in Landscape Architecture: Landscape Ecology (2)**

Lecture—2 hours. Prerequisite: course 50 or an introductory course in Ecology. Theories, major concepts and research methods of landscape ecology. Spatial structure, function and dynamics of various landscape types. Biological conservation, ecological restoration, and landscape planning, design, and management. Not open for credit to students who have taken Landscape Architecture 183. GE credit: SciEng | SE, WE.

### **180G. Special Topics in Landscape Architecture: Landscape and Regional Land Planning (2)**

Lecture—2 hours. Prerequisite: upper division standing. Theories, laws, and practices of community planning. Creation of livable and sustainable communities and natural landscapes, Smart growth, new urbanism, neo-traditional town planning, transit-ori-

ented, and sustainable communities. Traditional master planning vs. participatory planning and design approaches. GE credit: SocSci | ACGH, SS.

### **180I. Special Topics in Landscape Architecture: Regenerative Landscape Systems (2)**

Lecture—2 hours. Prerequisite: courses 1 and 30. Priority given to Landscape Architecture majors. Theories, basic techniques and applications for various systems by which landscapes regenerate and sustain life (both human and non-human) and culture over time. GE credit: SL.

### **180J. Special Topics in Landscape Architecture: Community Participation in Design (2)**

Lecture—2 hours. Prerequisite: upper division standing. History and role of community participation in landscape design; methods of community involvement, including workshop techniques. Introduction to design processes, including public participation. GE credit: SocSci | ACGH, DD, SS.

### **180K. Special Topics in Landscape Architecture: Social Factors in Landscape Architecture (2)**

Lecture—2 hours. Prerequisite: Psychology 155 and upper division standing. Concepts in environmental psychology as they relate to landscape architecture. Discussion of needs of various user groups of a land area. Introduction to post occupancy evaluations. GE credit: SocSci | DD, SS, WE.

### **180L. Special Topics in Landscape Architecture: Public Open Space (2)**

Lecture—2 hours. Prerequisite: upper division standing. Intensive study of public open spaces, including parks, plazas, playgrounds, greenways and community gardens. Current issues associated with design and management of the public environment of cities.

### **180M. Special Topics in Landscape Architecture: Urban and Community Design (2)**

Lecture—2 hours. Prerequisite: upper division standing. Theories and methods of community and neighborhood design. Past and contemporary approaches including new urbanism, planned unit development, mixed use, pedestrian and transit-oriented development. Issues of open space and community form.

### **180N. Special Topics in Landscape Architecture: Planting Design (2)**

Lecture—2 hours. Prerequisite: upper division standing; Environmental Horticulture 6. Develop an understanding of the sensory, visual and functional importance of plants in the landscape. Visualization and design of planted landscapes. Development of planting plans. Not open for credit to students who have taken course 156.

### **180O. Special Topics in Landscape Architecture: Current Issues in Landscape Architecture (2)**

Lecture—2 hours. Prerequisite: course 1 and 30. Priority will be given to Landscape Architecture and Design majors. Study of current issues in landscape architecture with emphasis on design and/or design history.

### **180P. Special Topics in Landscape Architecture: Water in Community Planning and Design (2)**

Lecture—2 hours. Prerequisite: course 50 or equivalent with consent of instructor. Upper division standing or above; priority given to Landscape Architecture majors. Theories, policies, methods, and resources related to the integration of water resources management with urban/community planning and landscape design including water use/demand, quality, treatment, conservation, and storm water/drainage.

### **180Q. Historic Preservation (2)**

Lecture—2 hours. Prerequisite: upper division standing. Priority given to Landscape Architecture majors. Roots and present focus of historic preservation

movement; current philosophies and laws governing preservation, restoration, and revitalization as they affect landscape architects.

#### **181A. Postmodern Landscapes Design and Planning Studio (3)**

Studio—6 hours; one field trip required. Prerequisite: course 170; course 180A concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180A. Offered in alternate years.

#### **181C. Art of the Environment Design and Planning Studio (3)**

Studio—6 hours; one field trip required. Prerequisite: course 170; course 180C concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180C.

#### **181F. Landscape Ecology Design and Planning Studio (3)**

Studio—6 hours. Prerequisite: course 170; 180F must be taken concurrently. Priority to Landscape Architecture majors. Design theory and methods to real-world projects in ecology. Ecological principles and their application in biological conservation, ecological restoration, and landscape planning, design, and management. Field trip required. GE credit: SciEng | OL, VL, SE.

#### **181G. Special Topics in Landscape Architecture: Landscape and Regional Land Planning Studio (3)**

Studio—6 hours. Prerequisite: course 170, course 181G concurrently. Applications of recent models and practices of urban planning and design to create livable and sustainable cities, towns, villages, rural, and natural landscapes. Testing of models by creating plans and designs for new communities, and for urban infill, restoration or redevelopment projects. Field trip required. GE credit: VL.

#### **181H. The Bioregional Landscape Design and Planning Studio (3)**

Studio—6 hours; one field trip required. Prerequisite: course 170; course 180H concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180H.

#### **181I. Regenerative Landscape Systems Design and Planning Studio (3)**

Studio—6 hours; one field trip required. Prerequisite: course 170; course 180I concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180I.

#### **181J. Community Participation in Design: Design and Planning Studio (3)**

Studio—6 hours; one field trip required. Prerequisite: course 170; course 180J concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180J. GE credit: DD, OL, VL.

#### **181K. Social Factors in Landscape Architecture Design and Planning Studio (3)**

Studio—6 hours; one field trip required. Prerequisite: Psychology 155, course 170, 180K concurrently. Priority to Landscape Architecture majors. Application of design theory and methods to real-world projects. Familiarize students with the major concepts in environmental psychology as they relate to landscape architecture; to discuss the needs of various user groups; and post occupancy evaluations. GE credit: DD, OL, VL.

#### **181L. Public Open Space Design and Planning Studio (3)**

Studio—6 hours; one field trip required. Prerequisite: course 170; course 180L concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180L.

#### **181M. Urban and Community Design: Design and Planning Studio (3)**

Studio—6 hours; one field trip required. Prerequisite: course 170; course 180M concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180M.

#### **181N. Planting Design and Planning Studio (3)**

Studio—6 hours; one field trip required. Prerequisite: course 170 and Environmental Horticulture 6; course 180N concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180N.

#### **181O. Current Issues Design and Planning Studio (3)**

Studio—6 hours; one field trip required. Prerequisite: course 170; course 180O concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180O.

#### **181P. Special Topics in Landscape Architecture: Water in Community Planning and Design Studio (3)**

Studio—6 hours. Prerequisite: courses 50 and 61 (or equivalent courses with consent of instructor); course 170; course 180 concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to community and site scale projects associated with course 180P.

#### **181Q. Special Topics in Landscape Architecture: Historic Preservation Studio (3)**

Studio—6 hours. Prerequisite: junior standing in the Landscape Architecture program; course 180Q to be taken concurrently. Methods and tools currently used by professional preservation architects and planners, including inventory and evaluation methods and traditional planning and design approaches. Field trip required.

#### **190. Proseminar in Landscape Architecture (1)**

Seminar—1 hour. Lectures and discussion of critical issues in landscape architecture. May be repeated three times for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

#### **191. Landscape Architecture Planning & Design Studio (2-12)**

Seminar—1 hour; workshop—3 hours. Prerequisite: course 1, 70, and 170 or consent of instructor. Priority to Landscape Architecture majors. Faculty initiated workshops featuring advanced studies and applications of original work in landscape architecture. May be repeated for up to 20 units of credit.—F, W, S. (F, W, S.)

#### **192. Internship in Landscape Architecture (1-12)**

Internship. Prerequisite: senior standing in Landscape Architecture. Professional field experience in landscape architecture. May be repeated for a total of 12 units. (P/NP grading only.)—F, W, S. (F, W, S.)

#### **193A. Senior Project in Landscape Architecture (3)**

Studio—6 hours. Prerequisite: senior standing in Landscape Architecture. Limited enrollment. Projects will focus on a critical area of landscape architectural design, planning, analysis, communication, or research. Required of all Landscape Architecture majors. (P/NP grading only.)

#### **193B. Senior Project in Landscape Architecture (4)**

Studio—8 hours. Prerequisite: course 193A and senior standing in Landscape Architecture. Limited enrollment. Projects will focus on a critical area of landscape architectural design, planning, analysis, communication, or research. Required of all Landscape Architecture majors. (P/NP grading only.)

#### **197T. Tutoring in Landscape Architecture (1-5)**

Tutoring—3-15 hours. Prerequisite: consent of instructor. Tutoring in Landscape Architecture courses. (P/NP grading only.)

#### **198. Directed Group Study in Landscape Architecture (1-5)**

Prerequisite: consent of instructor. Directed group study. (P/NP grading only.)

#### **199. Special Study for Advanced Undergraduates in Landscape Architecture (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

#### **Graduate**

#### **200. Citizenship, Democracy, & Public Space (4)**

Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Introduction to seminal works in political theory, philosophy, and the social sciences that focus on citizenship and the public sphere; development of critical perspective regarding restructuring of public space in a pluralistic and global culture; discussion of contemporary case studies. (Same course as Geography 230.)

#### **201. Theory and Philosophy of the Designed Environment (4)**

Seminar—4 hours. Prerequisite: course 140 or the equivalent; graduate standing or consent of instructor. Examines the major theories of environmental design. Epistemology of design serves as framework to examine modern landscape architecture, architecture, urban design and planning. Normative theories of design are reviewed along with the social and environmental sciences.

#### **202. Methods in Design and Landscape Research (4)**

Seminar—4 hours. Explores many of the research and advanced design and planning methods employed in landscape architecture. Exercises provide the student with a vehicle for designing independent landscape research and creative activities. Lectures provide an historical overview of research methodology. —W. (W.J) Ng'Weno, Simpson

#### **204. Case Studies in Landscape Design and Research (4)**

Seminar—4 hours; field trip required. Prerequisite: graduate standing in Landscape Architecture, Ecology, Geography or Community Development or consent of instructor. Real-world designed environment situations where creative activity and/or basic research is the primary product. May be repeated for credit for a total of 12 units.

#### **205. Urban Planning and Design (4)**

Lecture—2 hours; discussion—2 hours. Limited to graduate students. Regulation, design, and development of the built landscape, planning and land development processes, zoning and subdivision regulation, site planning, urban design goals and methods, public participation strategies, creatively designing landscapes to meet community and ecological goals. (Same course as Geography 233.)—F. (F.) Wheeler

#### **210. Advanced Landscape Architecture Studio (4)**

Laboratory—8 hours. Prerequisite: course 113 or the equivalent; graduate standing or consent of instructor. Exposes students to real-world, designed-environment situations where creative activity and/or basic research is the primary product. Advanced landscape problems will be utilized at the site, urban or rural scale.

#### **215. Ecologies of Infrastructure (4)**

Seminar—4 hours. Open to graduate standing or consent of instructor. Focus on design practices and theory associated with ecological conceptions of infrastructure, including networked infrastructure, region, bioregion, regionalization, ecological engineering, reconciliation ecology, novel ecosystems, and theory/articulation of landscape change. (Same course as Geography 215.) Offered in alternate years.—Milligan

**240. Historic, Cultural Landscapes: Concept, Perception, Preservation (4)**

Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Historic cultural landscapes, as defined by the National Register of Historic Places. Identification and analysis of aerial extent, structured makeup, integrity, and historical significance using common and emerging methods and tools. Offered irregularly.

**250. Life-Place: Bioregional Theory and Principles (4)**

Seminar—3 hours; tutorial—1 hour. Prerequisite: graduate standing or consent of instructor. The emerging concept of bioregionalism as a hypothesis for environmental quality; theoretical structures and practical methods by which individuals and groups identify with naturally-bounded “life-places” or “bioregions” and strive to live respectfully and reciprocally within them.

**260. Landscape and Power (4)**

Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. How various representations of landscape have historically worked as agents of cultural power. Course framework is interdisciplinary, including studies of landscape representation in literature, art, photography, cartography, cinema, and landscape architecture. (Same course as Geology 252.)

**270. Environment and Behavior (4)**

Seminar—3 hours; tutorial—1 hour. Prerequisite: graduate standing or consent of instructor; Psychology 144 recommended. Factors that influence human's interaction with their surroundings and the mechanisms used for recognizing and addressing general and specific human needs in community design and development decisions. Offered irregularly.—W. (W.) Owens

**280. Landscape Conservation (3)**

Seminar—3 hours. Prerequisite: contact department for prerequisite courses; graduate standing or consent of instructor. Focus is on land planning, design, and management techniques to further the goal of resource preservation. Examines current critical theory in the establishment and management of conservation areas. Offered in alternate years.—W. (W.) Greco

**290. Graduate Seminar in Landscape Architecture (2)**

Seminar—2 hours. Prerequisite: graduate standing and consent of instructor. Seminar on selected topics in landscape architecture research, analysis, planning, design, communication, or education. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**297. Practicum in Landscape Architecture (1-10)**

Independent study—1-10 hours. Prerequisite: graduate standing and consent of instructor. Opportunity for students to work directly in the field with academics at other institutions or with professionals in an office setting. Gives experience beyond the confines of campus and allows direct interaction with the community. (S/U grading only.)—F, W, S. (F, W, S.)

**298. Group Study (1-5)**

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)—F, W, S. (F, W, S.)

**299. Directed Individual Research for Graduate Students (1-12)**

Requires consent of instructor. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**Professional****396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## Landscape Restoration

(College of Agricultural and Environmental Sciences)

This minor is of particular interest to students majoring in Wildlife, Fish, and Conservation Biology, Environmental Science and Management, Landscape Architecture, Biological Sciences, Evolution and Ecology, Plant Biology and Sustainable Environmental Design. Biological Sciences 2C or Plant Sciences 2 is a prerequisite to some courses in the minor. The minor is sponsored by the Department of Plant Sciences.

**Minor Program Requirements:**

**Landscape Restoration .....** **19-25** UNITS

Select one of Environmental Science and Policy 155, Plant Biology 102, 117, 147, Plant Sciences 144.....	4-5
Select one of Environmental Horticulture 100, 130, 133, Plant Biology 119, Plant Sciences 176.....	3-4
Soil Science 10 or 100.....	3-5
Environmental Horticulture 160 and 160L	4
Select one of Environmental Horticulture 150, Environmental Science and Policy 155L, Landscape Architecture 180F, 180H, 180I, Plant Sciences 130, Wildlife, Fish, and Conservation Biology 155 .....	2-4
Plant Sciences 192.....	3

**Minor Adviser.** T.P. Young (*Plant Sciences*)

**Advising Center** is located in 1224 Plant and Environmental Sciences 530-752-7738.

## Latin

See **Classics**, on page 211.

## Latin American and Hemispheric Studies

(College of Letters and Science)

Charles F. Walker, Ph.D., Program Director

**Program Office.** Hemispheric Institute on the Americas, 1277 Social Sciences and Humanities Building 530-752-3046

**Committee in Charge**

Jelmer Eerkens, Ph.D., Professor ( <i>Anthropology</i> )
Liza Grandia, Ph.D., Associate Professor ( <i>Native American Studies</i> )
Luis Guarnizo, Ph.D., Professor ( <i>Human and Community Development</i> )
Erin Hamilton, Ph.D., Assistant Professor ( <i>Sociology</i> )
Robert Irwin, Ph.D., Professor ( <i>Spanish &amp; Portuguese</i> )
Robert Newcomb, Ph.D., Professor ( <i>Spanish and Portuguese</i> )
Bettina Ng'wenyo, Ph.D., Associate Professor ( <i>African American &amp; African Studies</i> )
Pablo Ortiz, Ph.D., Professor ( <i>Music</i> )
Marc Schenker, Ph.D., Professor ( <i>Medicine &amp; Public Health</i> )
Charles Walker, Ph.D., Professor ( <i>History</i> )

The minor in Latin American and Hemispheric Studies offers students the opportunity to explore connections throughout the Western Hemisphere from an array of perspectives across multiple academic fields.

The minor is made up of six courses, arranged in three tiers: Basic (one lower division course on the history of Latin America); Core (two introductory upper division courses chosen from a designated list of fields other than History); and Elective (three additional upper division courses from a designated list of courses that focus primarily on Latin American

and/or Hemispheric issues). Students are strongly encouraged to develop proficiency in Spanish or Portuguese, either through course work (such as completion of Spanish 24 or 33), or through life experience such as study abroad.

**Minor Program Requirements:**

UNITS

**Latin American and Hemispheric Studies.....** **24**

Basic Courses .....	4
One course from: History 7A, 7B, 7C Core courses .....	8
One course each from two of the following categories:	
(a) Anthropology 144;	
(b) Native American Studies 115;	
(c) Spanish 150 or 151;	
(d) Political Science 143	

**Elective Courses .....** **12**

Three courses selected from the following list to achieve a total of 24 units: African and African American Studies 107A, 155, 163, 172, 180; Anthropology 130C, 146; Art History 151; Chicana/o Studies 130, 160; Comparative Literature 151, 152, 165; Film Studies 189; Music 127; Native American Studies 110A, 110B, 110C, 110D, 120, 125, 133, 181A, 181B, 181C, 184; History 160, 162, 163A, 163B, 164, 165, 166A, 166B, 167, 168, 169A, 169B; Spanish 107A, 117, 149, 151, 153, 154, 155, 156, 157, 158, 159, 163, 170, 171, 172, 174, 175, 176, 177; Portuguese 100, 159, 161, 162, 163; Women's Studies 80, 102

**Minor Adviser.** HIA program coordinator in 1277 Social Sciences and Humanities Building (530-752-3046) or Charles Walker in 1279 Social Science and Humanities Building (530-752-3046)

## Law, School of

Kevin Johnson, J.D., Dean

Madhavi Sunder, J.D., Associate Dean; Academic Affairs

Hollis L. Kulwin, J.D., Senior Assistant Dean; Student Affairs

Kristen Mercado, J.D., Assistant Dean; Admission and Financial Aid

Brett C. Burns, Senior Assistant Dean; Administration

**Dean's Office.** 1011 Martin Luther King, Jr. Hall 530-752-0243; <http://www.law.ucdavis.edu>

**Faculty**

Afra Afsharipour, J.D., Professor
Karima Bennoune, J.D., M.A., Professor
Kelly Behre, J.D., Lecturer
Ashutosh Bhagwat, J.D., Professor
Mario Biagioli, M.F.A., M.A., Ph.D., Professor
Alan E. Brownstein, J.D., Professor
Anupam Chander, J.D., Professor
Andrea C. Chandrasekher, J.D., M.A., Ph.D., Acting Professor
Gabriel Chin, J.D., Professor
Holly S. Cooper, J.D., Lecturer
William Dodge, J.D., Professor
Christopher S. Elmendorf, J.D., Professor
Floyd F. Feeney, LL.B., Professor
Katherine Florey, M.F.A., J.D., Professor
Richard Frank, J.D., Professor
Lawrence Green, J.D., Lecturer
Angela Harris, M.A., J.D., Professor
Jasmine Harris, J.D., Professor
Robert W. Hillman, J.D., Professor
David Horton, J.D., Acting Professor
John Patrick Hunt., J.D., Acting Professor
Lisa Ikemoto, J.D., Professor
Edward J. Imwinkelried, J.D., Professor
Elizabeth E. Joh, J.D., Professor
Margaret Z. Johns, J.D., Senior Lecturer

Kevin R. Johnson, J.D., Professor  
 Thomas W. Joo, J.D., Professor  
 Courtney G. Joslin, J.D., Acting Professor  
 Hollis L. Kulwin, J.D.  
 Leslie A. Kurtz, J.D., Professor  
 Carlton F.W. Larson, J.D., Professor  
 Peter Lee, J.D., Professor  
 Evelyn A. Lewis, J.D., Professor  
 Albert C. Lin, J.D., Professor  
 Lesley K. McAllister, J.D., Ph.D., Professor  
 Miguel Mendez, J.D., Professor  
 Barbara Milner, J.D., Ph.D., Lecturer  
 Millard Murphy, J.D., Lecturer  
 Amagda Perez, J.D., Lecturer  
 Rex R. Perschbacher, J.D., Professor  
 Lisa R. Pruitt, J.D., Professor  
 Leticia Saucedo, J.D., Professor  
 Darien Shanske, M.S., J.D., Ph.D., Professor  
 Donna Shestowsky, M.S., J.D., Ph.D., Professor  
 Brian Soucek, J.D., Ph.D., Acting Professor  
 Madhavi Sunder, J.D., Professor  
 Clayton Tanaka, J.D., Lecturer  
 Dennis Ventry, J.D., Professor  
 Rose Cuson Villazor, J.D., LL.M., Professor  
 Carter C. White, J.D., Lecturer

### Emeriti Faculty

John D. Ayer, J.D., LL.M., Professor Emeritus  
 Antonio Bernhard, J.D., Professor Emerita  
 Carol S. Bruch, J.D., Professor Emerita  
 Joel C. Dobris, LL.B., Professor Emeritus  
 Harrison C. Dunning, LL.B., Professor Emeritus  
 Daniel Wm. Fessler, J.D., S.J.D., Professor Emeritus  
 Arturo Gándara, J.D., Professor Emeritus  
 George S. Grossman, LL.B., M.S., L.S., Professor Emeritus  
 Bill Ong Hing, J.D., Professor  
 John B. Oakley, J.D., Professor Emeritus  
 John W. Poulos, J.D., Professor Emeritus  
 Edward H. Rabin, LL.B., Professor Emeritus  
 Cruz Reynoso, LL.B., Professor Emeritus  
 Mortimer D. Schwartz, J.D., LL.M., Professor Emeritus  
 Daniel L. Simmons, J.D., Professor  
 James F. Smith, J.D., Senior Lecturer Emeritus  
 Martha S. West, J.D., Professor Emerita  
 Bruce A. Wolk, J.D., Professor Emeritus  
 Richard C. Wydick, LL.B., Professor Emeritus

### Courses in Law (LAW)

**Courses of Instruction.** The courses listed below have all been taught at least once in the last three years. There is no guarantee that any given course will be taught within the next three years. The numbers in parentheses indicate the number of semester credits. Please see Law School Course Description Page for current information <http://www.law.ucdavis.edu/current/registrar/course-descriptions.html#>.

### Professional Curriculum

#### First Year Courses

##### 200. Introduction to Law (1)

Discussion—1 hour. Introduction to basic concepts of the law, the historical roots of common law and equity, the precedent system in its practical operation, the modes of reasoning used by courts and attorneys, and the fundamentals of statutory interpretation. (S/U grading only.)

##### 200CT. Introduction to US Legal Methods B (3)

Lecture/discussion—3 hours. Course is designed to provide background skills necessary to succeed in both law school and legal practice. Students gain an introductory working knowledge of the US legal method which includes learning various forms of legal writing and speaking.

##### 201. Property (4)

Discussion—4 hours. A study of doctrines and concepts of property law with primary emphasis on real property. Course coverage includes: the estates in land system; the landlord-tenant relationship, conveyancing, and private and public land use control.

##### 202. Contracts (5)

Discussion—5 hours. Examines sorts of promises that are enforced and the nature of protection given promissory obligations in both commercial and non-commercial transactions. Inquiry is made into the means by which traditional doctrine adjusts or fails to adjust to changing social demands.

##### 203. Civil Procedure (5)

Discussion—5 hours. A study of the fundamental and recurrent problems in civil actions including the methods used by federal and state courts to resolve civil disputes.

##### 204. Torts (5)

Discussion—5 hours. Familiarizes students with legal rules, concepts and approaches pertinent to the recovery for personal injuries, property damages and harm done to intangible interests.

##### 205. Constitutional Law I (4)

Discussion—4 hours. The principles, doctrines and controversies regarding the basic structure of and division of powers in American government. Specific topics include judicial review, jurisdiction, standing to sue, federalism, federal and state powers and immunities, and the separation of powers among the branches of the federal government.

##### 206. Criminal Law (3)

Discussion—3 hours. Study of the bases and limits of criminal liability. Coverage of the constitutional, statutory, and case law rules which define, limit, and provide defenses to individual liability for the major criminal offenses.

##### 207. Legal Research and Writing I (2)

Discussion/laboratory—2 hours. This fall semester course taught by Wydick Fellowship Program faculty is an integrated legal research and writing skills course. Basic legal research resources and strategies are introduced and practiced.

##### 208. Legal Research and Writing II (2)

Discussion—2 hours. Focuses on persuasive writing and oral advocacy. Students will complete integrated research and writing assignments, including a complaint, a strategic defense office memorandum, a motion to dismiss in federal court, and an appellate brief, with oral arguments by all students.

#### Second and Third Year Courses

- (a) General/Topical Survey Courses: 224, 254A, 257, 277T, 281, 285C, 285D, 294A, 298
- (b) Business Law: 215, 215A, 220, 228, 232, 236A, 236B, 242, 243, 247, 253, 255, 266A, 269A, 269C, 271A, 271B, 284, 286D, 291A, 291B
- (c) Constitutional Law: 216A, 218, 240, 288, 288A
- (d) Criminal Law: 210, 210A, 213, 213A, 227A, 245, 245T, 276, 286D
- (e) Estate Planning: 214, 223, 221
- (f) Environmental Law: 235, 235A, 256, 264, 264A, 265, 282, 285, 285A, 285B, 285C, 285T, 289A, 409, 450
- (g) Family Law: 225, 242, 272, 435
- (h) Health Law and Bioethics: 212A, 226, 286, 286A, 286B, 286C, 286D, 286E
- (i) Human Rights and Social Justice: 213A, 218, 220T, 222, 222A, 226, 231, 231A, 248B, 251T, 251B, 254, 254A, 259, 259P, 259T, 260, 267, 276, 277, 286B, 286D, 287A, 288, 292, 408, 420, 440, 450T, 460
- (j) Individual and Group Study: 411A, 41B, 416, 417, 418, 419, 498, 499
- (k) Intellectual Property and Technology: 209A 217, 248A, 266A, 274, 274A, 274D, 285C, 286, 295A, 296, 296T, 460
- (l) International, Comparative and Foreign Law: 210, 213A, 224, 230, 247A, 248, 248T1, 248B, 242, 252, 270, 274A, 291A, 291B, 292, 293, 440, 450T

- (m) Labor and Employment Law: 231A, 248F, 251, 251T, 255, 260, 279, 285C, 285D, 455
- (n) Legal Theories and Ethics: 220T, 237, 250, 258, 259, 284, 286C, 286D
- (o) Medicine and Mental Health Law: 212, 241, 286, 286A, 286B, 286C
- (p) Procedure and Jurisdiction: 242, 246, 257, 275, 281, 283, 297
- (q) Public Law and Policy 210T, 235, 235T, 240, 240A, 248, 254, 257, 257A, 279, 281, 285T, 287A, 287T, 293, 408A, 445, 460
- (r) Skills and Litigation: 211, 219, 219T, 228, 229, 239, 261, 263A, 271, 275, 278, 280, 297, 401A, 401B, 409, 410A, 410B, 410C, 412, 413, 414, 415, 430, 451, 465
- (s) Taxation: 214, 220, 220T, 247, 247B, 255, 271, 271A, 271B
- (t) Clinical Programs-Externships: 425, 430, 445, 450, 455, 460, 470
- (u) Clinical Programs-In-House Clinicals: 420, 435, 440, 480, 485
- (v) Individual and Group Study: 411, 411B, 416, 417, 418, 419, 495, 499

#### 200A. Introduction to the Law of the United States (2)

Discussion—2 hours. History and fundamental principles of the United States's legal system. Important current legal issues, developments and trends. Required for LL.M. students who have not attended a U.S. law school. Fall semester only.

#### 200BT. Introduction to US Legal Methods A (3)

Lecture/discussion—3 hours. Course is designed to provide background skills necessary to succeed in both law school and legal practice. Students gain an introductory working knowledge of the US legal method which includes learning various forms of legal writing and speaking.

#### 207A. Legal Research (LLM) (1)

Discussion—1 hour. Restricted to LL.M. students only. A description of the evolution and use of sources of law and secondary authority.

#### 207B. Advanced Legal Research (2)

Seminar—2 hours. Restricted to 35 students. Will introduce students to advanced legal research tools and techniques used in practice, including efficient computer research techniques.

#### 208A. Legal Research and Writing II (LLM) (2)

Discussion—2 hours. Persuasive writing and oral advocacy. LLM section students complete integrated research and writing assignments, including a complaint, a strategic defense office memorandum, a motion to dismiss in federal court, and an appellate brief, with oral arguments by all students.

#### 209A. Patent Law (3)

Discussion—3 hours. Prerequisite: course 274 or consent of instructor. Covers all essential aspects of patent law: patentable subject matter, novelty, utility, nonobviousness, enablement, prosecution, infringement, and remedies.

#### 209AT. Patent Prosecution and Practice (2)

Discussion—2 hours. Prerequisite: course 274 or consent of instructor. Essential aspects of patent prosecution: the role of the patent practitioner, claims and specification drafting, requirements, and strategy, appeals and post-grant proceedings, American Invents Act considerations, portfolio development and strategy, and litigation considerations.

#### 209CT. Patentable Subject Matter: Genes, Methods, and Software (2)

Seminar—2 hours. Prerequisite: course 274, 209A, 209AT. An in-depth look at recent cases and debates behind genetic patenting, software; business models; diagnostic methods, and others. Reviews the crucial and rapidly evolving field of patent law which affects some of the most important hi-tech industries.

**209T. Innovation and Technology Transfer Seminar (2)**

Seminar—2 hours. Prerequisite: course 209A or 274, recommended but not required. Restricted to 15 students. From biomedicine to cleantech, public institutions are playing leading roles in developing cutting-edge technologies. Explores the law and policy of publicly-supported innovation and technology transfer.

**210. Reforming the Police and Criminal Justice (2)**

Seminar—2 hours. Focus on major current issues: policing ethnic neighborhoods; use of deadly force; modernizing the work of prosecutors and defense counsel. Class limit: 25 students.

**210A. Policing Seminar (2)**

Seminar—2 hours. Restricted to 10 students. What are the expectations and roles of the police in a democratic society? We need order maintenance and crime control, but to assume these tasks the police sometimes intrude upon interests considered fundamental to free societies.

**210B. Sociology of Criminal Procedure (2)**

Seminar—2 hours. Limited enrollment. What are the expectations and roles of the police in a democratic society? We need order maintenance and crime control, but to assume these tasks the police sometimes intrude upon interests considered fundamental to free societies.

**210C. Sexual Assault and the Law (2)**

Seminar—2 hours. Criminal law of sexual assault, traditional and modern offenses, and proposals for reform. Discussion of procedural developments, victim's counsel, evidentiary reform, and ADR. And the implications for civil law, tort liability, Title VI, Title IX, and civil liability of perpetrators.

**210D. Wrongful Convictions (2)**

Seminar—2 hours. Course will explore the magnitude and complexity of the wrongful convictions, their causes and remedies under existing law, and possible fixes (reforms). It will emphasize relevant legal rules (Criminal Procedure, Evidence, Post-Conviction Review).

**211. Negotiations (2)**

Discussion—2 hours. Limited enrollment. Skills course teaches theoretical and empirical approaches to negotiation strategy for the purposes of making deals and resolving disputes. Students participate in simulations to hone their negotiation skills, and write analytical papers.

**211A. Advanced Negotiations Strategy and Client Counseling (3)**

Discussion—3 hours. Prerequisite: consent of instructor. Application course; must apply and secure professor approval to enroll; will involve participating in discussions and a series of simulations; your classmates will be counting on you to actively participate and be well prepared for every simulation; do not apply to take this course unless you are willing and able to participate fully and can accept constructive feedback; if you anticipate missing more than two class sessions, do not apply to take this course. Understand the dynamics of interviewing and counseling process. Designed to be relevant to a broad spectrum of negotiation problems that are faced by legal professionals.

**211BT. International Business Negotiations (3)**

Laboratory/discussion—3 hours. Course is structured around a simulated negotiation exercise with students from a similar class at Stanford Law School. Students will experience the development of a business transaction over an extended negotiation in a context that replicates actual legal practice.

**212A. Medical Liability Law and Policy (2)**

Discussion—2 hours. This course will consider the many ways in which society seeks to establish and maintain quality in patient care.

**213A. Transnational Criminal Law (3)**

Discussion—3 hours. Prerequisite: course 205; course 206. Will examine the laws responses to a particular aspect of globalization, transnational

crime. The course will explore the phenomenon of transnationality and how it affects the power of nationstates, acting alone or together, to prosecute certain crimes.

**213T. Terrorism and International Law (2)**

Seminar—2 hours. International terrorism remains a pressing concern. Devising effective remedies for responding to it within the bounds of the law is critical. Therefore, the new generation of international lawyers needs to be familiar with the relevant law and standards.

**214. Estate and Gift Tax (3)**

Discussion—3 hours. Prerequisite: course 220; course 221 recommended. Fundamentals of federal transfer taxation, including the estate tax, the gift tax, and the generation-skipping transfer tax.

**215. Business Associations (4)**

Discussion—4 hours. Legal rules and concepts applicable to business associations, both public and closely held. Corporate form of organization, partnerships and other associational forms.

**215A. The Law of Corporate Governance Seminar (2)**

Seminar—2 hours. Prerequisite: course 215. Advanced issues in the governance of publicly held corporations. Separation of ownership and control and how the law has addressed this issue at the theoretical level and in the context of topics such as the duties of corporate directors, shareholder voting rights, and competition among states to attract corporate charters.

**215S. Special Session Business Associations (4)**

Discussion—4 hours. Provides a broad survey of the legal rules and concepts applicable to business associations, both public and closely.

**216A. Law and Religion (2)**

Discussion—2 hours. Restricted to 20 students. Federal constitutional law relating to religion; the interpretation and application of the Free Exercise Clause and the Establishment Clause of the First Amendment.

**217. Telecommunications Law (3)**

Discussion—3 hours. Economic and administrative regulation of telephony, radio and television broadcasting, and video technologies such as cable and direct broadcast satellites. Emphasis on the recently enacted Telecommunications Reform Act and the role of the Federal Communications Commission, as well as other sources of regulation such as related antitrust law and state public utility regulation.

**218. Constitutional Law II (4)**

Discussion—4 hours. Not open to students who have completed course 218A or 218B. Principally covers the First Amendment and the Equal Protection Clause.

**218A. Constitutional Law II—Equal Protection (2)**

Discussion—2 hours. Students who have previously taken course 218, or who plan to take course 218 for 4 units in Spring 2011, may not take this course. Students enrolled in this course will be given priority registration spring semester 2011 to enroll in course 218B. Focuses on the Equal Protection Clause of the Fourteenth Amendment.

**218B. Constitutional Law II—First Amendment (2)**

Discussion—2 hours. Students who have previously taken course 218 or who plan to take course 218 for 4 units in Spring 2011 may not take this course. Students not required to take course 218A in order to take this course. Principally covers the free speech clause of the First Amendment.

**218D. Constitutional Theory Seminar (2)**

Seminar—2 hours. Provides students with a broad understanding of the shape of modern constitutional theory, and the ability to understand the implications of that theory for concrete historical and modern constitutional disputes.

**218ET. California Constitutional Law (2)**

Discussion—2 hours. Reviews, interpretive meta-rules for constitutional construction, structure and institutions of state government, civil liberties under the Declaration of Rights, the impact of race in California society, and criminal law.

**218T. Selected Topics in Constitutional Law (2)**

Seminar—2 hours. Examines two core themes of Constitutional Law I and Federal Jurisdiction: federalism and separation of powers. Concentrates on habeas corpus and the Eleventh Amendment as vehicles for examining the constitutional themes in greater depth.

**218TA. Separation of Powers (2)**

Discussion—2 hours. Study of the separation of powers in our federal government by focusing on certain historical events and their impact on constitutional law.

**218TB. Law of War (3)**

Discussion—3 hours. Surveys the law of armed conflict as it applies to today's battlefields.

**218TC. Antidiscrimination Law (4)**

Discussion—4 hours. Course offers an overview of federal constitutional and statutory antidiscrimination law in the United States.

**219. Evidence (4)**

Discussion—4 hours. Covers rules regarding the admissibility of testimonial and documentary proof during the trial of civil and criminal cases, including rules governing relevancy, hearsay, the examination and impeachment of witnesses, expert opinion, and constitutional and statutory privileges.

**219A. Advanced Evidence (3)**

Discussion—3 hours. Prerequisite: course 219. Limited to six students; selected by professor. Interested students complete an application form; available in the Law Registrar's Office. Credit is contingent on attending all classes and participating in all exercises. Participation is crucial to the success of the course, as students will be working in teams of three. Do not take this course unless you are willing and able to participate fully and can accept criticism. Public interest lawyers often spend much time in the courtroom. Prosecution, defender, and legal aid offices usually don't have resources to train lawyers in trial work. Seeks to help remedy this deficiency by helping develop witness interrogation skills. (S/U grading only.)

**220. Federal Income Taxation (4)**

Discussion—3 hours. Surveys the federal income tax system, with consideration of the nature of income, when and to whom income is taxable, exclusions from the tax base, deductions and credits, and tax consequences of property ownership and disposition.

**220A. Federal Income Taxation (3)**

Discussion—3 hours. Surveys the federal income tax system, with consideration of the nature of income, when and to whom income is taxable, exclusions from the tax base, deductions and credits, and tax consequences of property ownership and disposition.

**220B. Tax and Distributive Justice (3)**

Discussion—3 hours. Advanced tax course designed to introduce students to issues of tax policy, with particular emphasis on tax distribution (i.e., who or what should pay taxes in society) and tax incidence (i.e., who or what ends up paying taxes in society).

**220BT. Law of Banking and Financial Institutions (2)**

Discussion—2 hours. Guide to dual regulatory system, and an understanding of banks and other financial institutions, such as thrifts, credit unions, industrial banks, finance companies, and money transmitters, as well as large versus community banks.

**220S. Special Session Federal Income Taxation (2)**

Discussion—2 hours. Introduction to the basic principles of federal income taxation using the American federal tax model. Topics include identification of

income subject to taxation, gains and losses from property transactions, the timing of income and deductions and the identity of people subject to tax on particular items of income.

### **220T. State and Local Taxation (3)**

Discussion—3 hours. Introduction to fundamentals of state and local taxation. Beginning with historical and constitutional aspects, students will analyze recent developments in state and local taxation and their impact on client representation.

### **221. Trusts, Wills and Decedents' Estates (3)**

Discussion—3 hours. Study of the law of decedent's estates, wills, and trusts.

### **221AT. Practical Skills in Will and Trust Drafting and Administration (2)**

Laboratory/discussion—2 hours. Course provides students with the skills to practice law in the area of estate planning and probate/trust administration. Students will follow an estate planning client and draft actual estate plan documents. A series of related topics will be explored.

### **222. Critical Race Theory Seminar (3)**

Discussion—3 hours. Examines race relations and racial discrimination in America through the perspectives of proponents of the Critical Race Theory (CRT) movement, a collection of legal scholars who challenge both conservative and liberal political orthodoxies.

### **222A. Latinos and Latinas and the Law (2)**

Seminar—2 hours. Seminar analyzes some of the legal issues of particular relevance to the Latino community in the United States, including racial identity, immigration, language regulation, national and transnational identity issues, affirmative action, and civil rights.

### **222T. Asian Pacific Americans and Law (2)**

Discussion—2 hours. Profound impact on how American Law has shaped Asian Pacific Americans demographics, experiences, and possibilities of Asian Americans will be examined.

### **223. Estate Planning Seminar (2)**

Seminar—2 hours. Prerequisite: course 221. Limited enrollment. Selected topics in the estates and trusts area. Content varies with instructor. Satisfies the advanced legal writing requirement.

### **224. Animal Law Seminar (2)**

Seminar—2 hours. An introduction to legal principles affecting animals and their use. GE credit: WE.

### **225. Marital Property (2)**

Discussion—2 hours. The California community property system, including the rights of marital and domestic partners during the ongoing relationship, and upon the end of the relationship by death or divorce.

### **226. Disability Rights (3)**

Discussion—3 hours. Examines disability law and theory with emphasis on U.S. statutory law (particularly, Americans with Disabilities Act, ADA Amendments Act, and Individuals with Disabilities Education Act) as it applies to employment, education, public accommodations, and government services and programs.

### **226ET. Mental Disability Law (3)**

Lecture/discussion—3 hours. Students will examine the civil and constitutional bases of mental disability law, as well as its history, and explore the role of mental disability in the policing and criminal trial process.

### **227A. Criminal Procedure (3)**

Discussion—3 hours. Federal constitutional limits on government authority to gather evidence and investigate crime. Topics include Fourth Amendment limits on search, seizure, and arrest; the Fifth Amendment privilege against self-incrimination; and the Sixth Amendment right to counsel.

### **227B. Advanced Criminal Procedure (3)**

Discussion—3 hours. Examines a range of issues, including bail, charging decisions, preliminary hearings, discovery, statute of limitations, venue, joinder

and severance, pleas, plea bargaining, assistance of counsel, trial, double jeopardy, sentencing, appeal and collateral remedies.

### **227CT. Topics in California Criminal Practice (2)**

Seminar—2 hours. Advanced criminal law and procedure class aimed at students planning to practice criminal law in California, either as an extern or summer clerk, or after graduation.

### **228. Business Planning and Drafting (4)**

Discussion—4 hours; extensive writing. Prerequisite: course 215; prerequisite will not be waived, do not register for the course unless you have completed course 215. Limited enrollment. Introduces students to a number of legal and business considerations relevant to forming and operating an emerging growth business (such as technology startup).

### **228A. Mergers and Acquisitions Law (2)**

Discussion—2 hours. Prerequisite: course 215. Takes a practical approach to mergers and acquisitions, with an in-depth look at the planning, negotiation, documentation and completion of mergers and acquisitions.

### **228B. Accounting for Lawyers (2)**

Discussion—2 hours. Exposes student to basic principles of accounting, from the perspective of the practicing attorney.

### **228C. Law and Statistics (3)**

Discussion—3 hours. Introduction to fundamentals of statistical analysis and how statistical analysis is used in the law and public policy. Course goal is to help students become excellent consumers of statistical information and evidence.

### **229. Scientific Evidence (3)**

Discussion—3 hours. Prerequisite: course 219. Limited enrollment. In addition to examining the evidence law governing the admission of scientific testimony, this course considers trial advocacy in presenting and attacking such testimony.

### **230. International Environmental Law (3)**

Discussion—3 hours. Prerequisite: prior course work in environmental law and/or international law is helpful. Elective Course for Environmental Law Certificate Program. May satisfy Advanced Writing Requirement with professor's permission. Provides an overview of the structure and basic principles of international environmental law and policy.

### **230T. Free Trade and the Environment (2)**

Seminar—2 hours. Free Trade and Environ. Course Description: Examines the relationship between legal rules relating to trade and rules for the protection of the environment.

### **231. Sex Based Discrimination (3)**

Discussion—3 hours. Issues raised by legal and social distinctions between men and women. Explores potential remedies for discrimination drawn from constitutional law, statutory enactments, and common law developments. Subject matter areas include sex-based discrimination in constitutional law, family law, reproductive rights, educational opportunity, criminal law, and employment.

### **231A. Sexual Orientation, Gender Identity, and the Law (3)**

Discussion—3 hours. Examines the legal and social regulation of sexual orientation and gender identity.

### **232. Real Estate Finance (2)**

Discussion—2 hours. An examination of the problems involved in the acquisition, financing, and development of real estate, and of lender remedies and debtor protections in the event of debtor default. The practical application of California legal doctrines.

### **232AT. Real Estate Transactions (2)**

Discussion—2 hours. Review of legal issues in the purchase, sale, financing of residential real estate in US, with non-exclusive focus on California. Roles of parties involved, mechanisms of financing and security, survey of remedies, and role of mortgage lending beginning in 2008.

### **232T. Property Law & Race (2)**

Seminar—2 hours. Seminar explores the extent to which property law (common law, federal, state, and local statutes, and administration regulations) historically impacted and currently shapes conceptions of race, racial groups, and racial relations.

### **233. Asylum and Refugee Law (2)**

Seminar—2 hours. Course surveys U.S. and international law concerning refugees and asylum-seekers. This class will question the meaning of persecution, the definition of "particular social groups" in U.S. law, protections for gender-related violence, statutory bars to asylum, and U.S. refugee policy.

### **235. Administrative Law (3)**

Discussion—3 hours. Examines how the U.S. Constitution and the federal Administrative Procedure Act constrain and regulate decision making by government agencies and officials.

### **236. Securities Regulations (3)**

Discussion—3 hours. Prerequisite: course 215. Regulation of the distribution of securities under the Securities Act of 1933 and SEC Rules adopted there under, registration and reporting provisions of the 1934 Securities Exchange Act.

### **236A. Securities Regulation I (2)**

Discussion—2 hours. Prerequisite: course 215 or consent of instructor. Legal rules and concepts applicable to business associations, both public and closely held. Corporate form of organization, partnerships and other associational forms.

### **236B. Securities Regulation II (2)**

Discussion—2 hours. Prerequisite: course 215 or consent of instructor; course 236A recommended. Securities Exchange Act of 1934 and the regulation of securities markets. Topics covered include regulation of securities markets and securities professionals, responsibilities of securities lawyers, continuous reporting, transnational securities fraud, and enforcement of the securities acts.

### **237. Legal History (2)**

Discussion—2 hours. Course traces the development of the common law from its origins in medieval England through the twentieth-century.

### **237B. Special Topics in Legal Theory: Ancient Athenian Law (2)**

Seminar—2 hours. Athenian legal system was different from our own and was far less formal. How did it work? Why did it work? Why have political and legal theorists misunderstood Athens for so long and what can we learn from that failure?

### **239. Representing Clients in Mediation (3)**

Discussion/laboratory—3 hours. Restricted to 24 students. Interactive course focuses on attorney representation of clients in mediation.

### **240. Elections and Political Campaigns (2)**

Discussion—2 hours. Limited enrollment. Covers selected constitutional and statutory aspects of federal and state elections, including campaign finance, initiatives, and other topical issues.

### **240A. Law of the Political Process (3)**

Discussion—3 hours. Covers many of the foundational issues in the "law of democracy," as that body of statutory and constitutional law has developed in the United States.

### **241T. Voting Rights Seminar (2)**

Seminar—2 hours. Seminar addresses current issues in the protection of voting rights, particularly the voting rights of racial and ethnic minorities.

### **242. Conflict of Laws (2)**

Discussion—3 hours. Study of how law operates across state and national borders. Topics include choice of applicable law in transactions involving multiple jurisdictions, recognition of judgments, and the exercise of jurisdiction.

### **242S. Special Session Conflict of Laws (2)**

Discussion—2 hours. Study of transactions with multi-state and international contracts. Topics include jurisdiction, recognition of foreign judgments, and choice of applicable law. Addresses problems that

international lawyers encounter in a wide variety of deals with the emphasis on international commercial deals.

### **243. Commercial and Bankruptcy Law (4)**

Discussion—4 hours. The business debtor who doesn't have enough money (or is unwilling) to pay his debts. Remedies available to creditors to force payment, along with devices that creditors may use to give themselves priority against limited assets. Examination of the role of bankruptcy. Bankruptcy both as a means for providing funds for creditors, and as a device for maximizing asset value.

### **243A. Secured Transactions (3)**

Discussion—3 hours. Secured transactions are transactions where a lender takes an interest in debtor's property as "collateral," or security, for repayment of a loan. Covers secured transactions in personal property such as auto and bank loans against business inventory.

### **243CT. Advanced Bankruptcy Practice (2)**

Discussion—2 hours. Course will cover corporate chapter 11 and its alternatives and analyze different professionals' roles. Selection of venue and formation of strategic objectives will also be discussed.

### **245. Corporate and White Collar Crime (3)**

Discussion—3 hours. The law of conspiracy, corporate criminal liability, mail and wire fraud, RICO, money laundering, and other business and environmental crimes and associated defenses.

### **245B. Death Penalty Seminar (2)**

Seminar—2 hours. Limited enrollment. Offers overview of the constitutional law governing the death penalty in the United States.

### **246. Federal Jurisdiction (3)**

Discussion—3 hours. Prerequisite: course 205. A study of subject-matter jurisdiction of federal courts.

### **247. Taxation of Partnerships and LLCs (2)**

Discussion—2 hours. Prerequisite: course 220. Study of the federal income tax treatment of partnerships and partners; including entities classified as partnerships.

### **247A. International Aspects of U.S. Taxation (3)**

Discussion—3 hours. Prerequisite: course 220. Completion or current enrollment in a course covering the domestic taxation of corporations is suggested but not required. Corporate Tax may be taken concurrently. Examine the U.S. income tax laws and policies related to the taxation of foreign income of U.S. persons and U.S. income of foreign person.

### **247B. Corporate Tax (2)**

Discussion/laboratory—2 hours. Examination of the federal income tax relationship between corporations and their owners. Covers the transfer of funds into a corporation on formation and the re-transfer of money and property from the corporation to its shareholders.

### **248. Public International Law (3)**

Discussion—3 hours. Introductory course covers basic international law concepts and the law-making process.

### **248A. Jurisdiction in Cyberspace Seminar (2)**

Seminar—2 hours. Limited enrollment. Review concepts in international law, conflicts of law, cyberlaw, and federal jurisdiction to address the growing multi-jurisdictional conflicts created by the Internet. Examine European efforts at crafting intra-Europe jurisdictional rules, as well as other international jurisdiction treaty projects such as those at the Hague.

### **248B. International Human Rights (2)**

Discussion—2 hours. Introduces international human rights legal system through an examination of its historical origins and precursors and a review of its international legal backdrop, including the character and sources of international law, the UN Charter and the UN system.

### **248BT. Human Rights in the Former Soviet Union: Legal Tools for Repression and Redress: Part II (2)**

Seminar—2 hours. This course first provides a historical context for the current political and human rights situation in the Former Soviet Union. It then analyzes the legal mechanisms and other strategies that some of the Former Soviet Union's countries governments employ to repress their own citizens. Finally, the class examines the ways in which citizens use the law to seek relief from remedies for the repression of their rights.

### **248CT. United Nations Human Rights Practicum (3)**

Discussion—3 hours. Students will engage in intensive research and writing in the field of cultural rights, the workings of the United Nations human rights system, and gain experience working with UN documents, individual cases in the field and with thematic reports.

### **248ET. Transitional Justice and Memory Politics in the Asia-Pacific (2)**

Seminar—2 hours. Transitional justice (legal responses to wrongdoings of repressive predecessor regimes) can help resolve "memory politics" that plague the relations and societies of many Asia-Pacific states. Together we will examine relevant roles of governments, novel institutions, the judiciary, and civil society.

### **248D. Globalization and the Law (3)**

Discussion—3 hours. Globalization of people, finance, goods, services, and information puts pressure on the nation-state form. In a world of diasporas and multinational corporations, what does citizenship mean? In the absence of a world government, can we grapple with problems that now take on a global form? We will canvass a number of different approaches, including: the technical coordination of the Basel Accord on capital adequacy; the World Trade Organization regime universalizing substantive legal standards related to intellectual property; the Internet governance regime offered by ICANN, a California not-for-profit corporation; private and state-based efforts to support global health financing; and the Kyoto Protocol's cap-and-trade system for responding to a global problem where the sources, costs and benefits are not uniformly distributed. We will also consider issues of extraterritoriality, regulatory competition, and so-called Asian Values.

### **248G. Legal Spanish for Lawyers (2)**

Seminar—2 hours. Prerequisite: must satisfy one of the following: undergraduate degree in Spanish; a minor in Spanish with experience living in a Spanish-speaking country; grew up in a Spanish-speaking household and achieved proficiency; able to pass an informal assessment by the instructor. Designed for law students who are native Spanish-speakers or who have achieved proficiency in Spanish through study or experiences in a Spanish-speaking country.

### **248T. Advanced International Law (2)**

Discussion—2 hour. Review books of international law; Hugo Grotius and Judge Rosalyn Higgins. Themes include peaceful resolutions of dispute, law of war and peace, and international legal process. GE credit: WE

### **248TA. Human Rights in Post Soviet Central Asia: Legal Tools For Repression and Redress (2)**

Discussion—2 hours. Limited enrollment. Provides a historical context for the current political and human rights situation in Central Asia.

### **248TC. International Economics Law (3)**

Discussion—3 hours. This course will examine the architecture of the international economic system, with a focus on both trade and investment.

### **248TT. Theories of International Law (2)**

Discussion—2 hours. International law, once critiqued as powerless and ineffective, is now challenged as a threat to American democracy. Introduction to competing theories of international

law, including natural law, positivism, realism, liberalism, constructivism, fairness, legal process, and world public order.

### **249. Comparative Law (3)**

Discussion—3 hours. The uses of comparative method, principal differences between common law and civil law and the styles of legal reasoning that prevail in these two great legal cultures. Topics include the evolution of the civil law, the phenomenon of codification, the structure of European civil codes and the interpretation of their provisions, the respective roles of counsel, judges and law teachers, civil law procedure, and the analysis of selected areas of substantive law. Knowledge of a foreign language is not required.

### **249S. Special Session Comparative Law (1)**

Discussion—1 hour. This course will provide a comparative perspective for students of American law. After an initial look at the uses of the comparative method, discussions will be centered around the main differences between common law and civil law and the different styles of legal thinking. Topics to be covered will be the evolution of the civil law and the idea of codification, the structure of European civil codes and the interpretation of their provisions, the personnel of the law and procedure in civil law countries, and the analysis of selected problems of substantive law. Knowledge of a foreign language will not be required.

### **250. Jurisprudence Seminar (3)**

Seminar—3 hours. Limited enrollment. Deals principally with the question of how judges should decide "hard cases," where the content of the law is in doubt and competent arguments have or could be offered for mutually inconsistent decisions in favor of either party.

### **250AT. Aoki Legal Scholarship Seminar (3)**

Seminar—3 hours. Course is for students participating in the Aoki Center for Race and Nation Studies' Immigration Law Journal. Students will research, and write a note on a topic related to immigration. The expectation is production of papers of publishable quality.

### **250BT. Writing Requirement Workshop (2)**

Seminar—2 hours. Students who have written a course paper or an independent study paper and would like to take papers to the next level, producing a work of publishable quality. (S/U grading only.) GE credit: WE.

### **250T. Asian American Jurisprudence (3)**

Discussion—3 hours. Legal, social, and political discourse on race relations has traditionally been framed in Black-White terms. This course disrupts the traditional view by taking Asian Americans seriously.

### **251. Labor Law (2)**

Discussion—2 hours. Survey of the legislative, administrative, and judicial regulation of labor relations under federal law. Historical development of labor law, the scope of national legislation, union organization and recognition, the legality of strikes, picketing, and the negotiation of collective bargaining agreements.

### **251T. Labor Law I (2)**

Discussion—2 hours. Restricted to students who previously took Labor Law in Fall 2008 may not enroll in Labor Law I. Survey of the legislative, administrative, and judicial regulation of labor relations under federal law.

### **251TB. Labor Law II (2)**

Discussion—2 hours. Prerequisite: course 251T preferred; not required. Survey of the legislative, administrative, and judicial regulation of labor relations under federal law.

### **252. International Litigation and Arbitration (3)**

Discussion—3 hours. Current developments in international law, conflict of laws, civil procedure, arbitration, and comparative law in the context of transactions and disputes that cut across national boundaries.

**254. Housing Law (2)**

Discussion—2 hours. Survey course covers legal and policy issues related to developing, protecting and preserving affordable, safe and accessible housing and sustaining viable, diverse communities.

**254A. Law and Rural Livelihoods Seminar (3)**

Seminar—3 hours. Provides broad overview of law as it relates and applies to rural people and places.

**254T. Practicum in Rural Community Advocacy (3)**

Seminar—3 hours. Limited enrollment. Provides an opportunity to learn about Participatory Action Research (PAR) methods and community-based lawyering in the context of rural community development and advocacy. Using these skills and knowledge to serve rural California communities.

**255. Pension and Employee Benefit Law (3)**

Discussion—3 hours. Prerequisite: course 220. The federal regulation and taxation of private pensions and employee benefits. The Employee Retirement Income Security Act (ERISA), including such topics as coverage, forfeitures, spousal rights, creditor access, fiduciary duties, preemption of state law, remedies, and other litigation issues. Internal Revenue Code issues such as discrimination in favor of the highly compensated, limitations on contributions and benefits, rollovers, IRAs, early distribution penalties, and minimum distribution rules.

**256. Land Use (2)**

Discussion—2 hours. Local agencies, developers, environmental interest groups, and others who regularly deal with the administrative and legislative applications of land use planning and development laws. Topics include zoning, general plans, local government land use regulation, and related areas of litigation. The expanding role of the California Environmental Quality Act.

**257. Legislative Process (2)**

Discussion—2 hours. Fundamental elements of the legislative process, including legislative procedure; the legislature as an institution; lobbying; statutory interpretation; legislative-executive relations; and the legislature's constitutional powers and limitations.

**257A. Legislative Intent Seminar (2)**

Seminar—2 hours. Theories and principles of statutory and constitutional interpretation. Original intent vs. living constitution; permissible kinds of evidence for determining legislative intent; canons of construction; extent to which initiatives should be interpreted similarly to legislative enactments.

**257B. Statutory Interpretation (3)**

Discussion—3 hours. Elective course for Environmental Law Certificate Program. Provides an introduction to the theory and practice of statutory interpretation.

**258. Professional Responsibility (2)**

Discussion—2 hours. The American Bar Association's Model Rules of Professional Conduct and the Code of Judicial Conduct, which are tested on the Multistate Professional Responsibility Examination, and the California Rules of Professional Conduct, which are tested on the California Bar Examination. Issues affecting the legal profession, including lawyers' ethical duties and responsibilities to clients, the courts, third parties, and the legal system.

**258A. Legal Ethics and Corporate Practice (3)**

Discussion—3 hours. Focus on corporate practice to explore the ethical responsibilities of lawyers.

**258BT. Mindfulness and Professional Identity (2)**

Seminar—2 hours. Introduction to the practice of meditation and connect it with readings about the legal profession in three key areas.

**258DT. Setting Up and Maintaining Solo Law Practice (1)**

Lecture/discussion—1 hour. Introduction/overview of how to start a successful solo practice.

**258ET. Utility of Law School and Careers in the Law (1)**

Discussion—1 hour. Despite improvements in the economy, some observers continue to question whether law school is a viable option for college graduates. The class will consider the controversy and expose students to the variety of careers in the legal profession. (S/U grading only.)

**259. Feminist Legal Theory (3)**

Discussion—3 hours. Provides an overview of feminist legal theory and considers how its various strands inform legislative and judicial law making. Satisfies Advanced Writing Requirement.

**259A. Women, Islam and the Law (2)**

Seminar—2 hours. This course will study legal and religious reform movements for women's rights within Muslim communities in the context of current scholarly and political debates about fundamentalism, democracy, equality, secularism, universalism, and multiculturalism. This is a limited enrollment seminar.

**259B. Women's Human Rights (2)**

Seminar—2 hours. Overview of international legal and institutional system for the protection of women's human rights from an academic perspective and the view of the practitioner. Includes the (CEDAW), violence against women, sexual and reproductive rights, economic rights, and more.

**259P. Women and the Law Practicum (1)**

Discussion/lecture. Prerequisite: prior or concurrent enrollment in course 259. Complements the content of the feminist legal theory course by providing students the opportunity to consider how feminist theory may be used to inform law-making.

**260. Employment Discrimination (3)**

Discussion—3 hours. Examine federal laws prohibiting employment discrimination, including Title VII of the Civil Rights Act of 1964, the Equal Pay Act, the Age Discrimination in Employment Act, the Americans with Disabilities Act, the Rehabilitation Act of 1973, and § 1981.

**260A. Employment Law (3)**

Discussion—3 hours. Provides an overview of employment law, labor law and employment discrimination law and aims to serve as a foundation for understanding the law and policy (statutory and common law) that surround the employer-employee relationship.

**261. Judicial Process (2)**

Discussion—2 hours. Examines a variety of issues concerning the judicial process. Focus is on judge's role in the legal process, the administration of justice, ethical issues, decision making, bias, and critical examination of the strengths and weaknesses in our current judicial system.

**262. Antitrust (3)**

Discussion—3 hours. Focus of the course is the federal antitrust laws, concentrating on basic substantive areas of the Sherman and Clayton Acts.

**262AT. US Antitrust Law and Indian Competition Law: A Comparative Perspective (2)**

Lecture/discussion—2 hours. Fundamental principles of Indian Competition Law and US Antitrust Law in a comparative perspective. The course will help American students, interested in future corporate law careers, to develop effective strategies for better managing cross border deals in India.

**262S. Special Session Antitrust (1)**

Discussion—1 hour. A study of the federal antitrust laws including price fixing, limits on distribution, tying arrangements, monopolization and mergers.

**262T. Regulated Industries (2)**

Discussion—2 hours. Examines regulation of business in sectors, traditionally described as "common carrier" and "utility" industries, where because of market failures normal competitive mechanism will not protect consumers from exercises of market power.

**263A. Trial Practice I (3)**

Discussion—2 hours; laboratory—1 hour. Prerequisite: course 219, may be taken concurrently. Limited enrollment. Introduction to the preparation and trial of cases, featuring lectures, videotapes, demonstrations, assigned readings and forensic drills. Laboratory held on Tuesday, Wednesday, and Thursday evening.

**264. Water Law (3)**

Discussion—3 hours. Property rights in surface waters, including riparian rights, prior appropriation, and public rights use of water bodies; environmental constraints on exercise of water rights; groundwater rights and management; federal allocation and control of water resources; legal aspects of interstate allocation.

**264A. Ocean and Coastal Law (3)**

Discussion—3 hours. Introduction to the goals and challenges of coastal and ocean policy; the complicated web of public and private interests in coastal lands and ocean waters; regulation of coastal development; domestic and international fisheries management; and preservation of ocean resources.

**265. Natural Resources Law Seminar (2)**

Seminar—2 hours. Prerequisite: course 285 or 256 recommended, but not required. Limited enrollment. In-depth coverage of two foundational principles of natural resources law: public trust doctrine and private property rights protected under the Takings Clause of the U.S. and many state constitutions.

**266A. Cyberlaw (2)**

Discussion—2 hours. Emerging legal issues crucial to the conduct of business in cyberspace. Discussion of the evolution and current administration of the Internet and the World Wide Web.

**267. Civil Rights Law (3)**

Discussion—4 hours. Civil remedies for civil rights violations under the primary United States civil rights statute. Specifically, covers actions for constitutional and statutory violations under 42 USC § 1983, affirmative defenses, and abstention doctrines.

**267B. Civil Rights Seminar (2)**

Seminar—2 hours. Limited enrollment. The social, political, legal and historical factors which led to the creation of the United States Commission on Civil Rights (USCCR) in 1957. The United States Commission on Civil Rights is a bipartisan, independent agency established by the Civil Rights Act. It is directed to investigate complaints alleging deprivations of the right to vote, and voter fraud; to study and collect information relating to discrimination and the denial of equal protection of the laws under the Constitution on the basis of race, color, religion, sex, age, disability, or national origin; and submit reports, findings and recommendations to the President and to Congress. The role that the USCCR has played and continues to play in American politics, legislative enactments and the national dialogue on equality, fairness and justice in the context of civil and human rights. Satisfies Advanced Legal Writing Requirement.

**268T. Suing the Government: Civil Rights, Torts, Takings, and More (2)**

Discussion—2 hours. Explores the basic requirements of suing government, including sovereign immunity, particular schemes for litigating against government (Federal Tort Claims Act, APA, False Claims Act, etc.), direct constitutional claims and the procedural pitfalls and remedies available against government.

**269. Basic Finance for Lawyers (2)**

Discussion—2 hours. Prerequisite: students with a non-law basic finance course will not be admitted, except with consent of instructor. Basic techniques of analysis that are part of the core curriculum in a good business school. Gives background necessary for understanding and advising your clients and for understanding other business-related law school courses.

**269A. Basic Finance (3)**

Discussion—3 hours. Students with a non-law basic finance course must have instructor's permission. Basic techniques of analysis that are part of the core curriculum in a good business school are studied. Purpose is to give you background necessary for understanding and advising clients and for understanding other business-related law courses.

**269AT. The Financial Crisis: Law & Policy and Inequality (2)**

Seminar—2 hours. Examines the regulation of financial intermediaries. The stated goal of regulation is to ensure systemic stability and to pursue consumer protection. We will ask whether there is an imbalance between systematic stability and consumer protection before the crisis of 2008.

**269C. Corporate Finance (3)**

Discussion—3 hours. Prerequisite: course 215 or concurrent enrollment recommended. Focus on how corporations raise money, stocks and bonds, etc.; how deals are structured and why corporations use one strategy instead of another.

**269D. Seminar on Financial Regulation (2)**

Seminar—2 hours. Introduction to the legal and regulatory issues presented by contemporary capital markets.

**269E. Public Finance: Theory and Practice (2)**

Seminar—2 hours. Students will be introduced to the basic concepts of public finance, the underlying law governing public finance: in particular state law, federal tax law and federal securities law.

**270. International Business Transactions (2)**

Discussion—2 hours. Select legal problems arising from international business transactions. Topics include the international sales contract, letters of credit, transfers of technology, regulation of bribery, development of joint ventures, repatriation of profits, and foreign exchange problems.

**270A. Life-Cycle Transactions and Drafting (3)**

Discussion—3 hours. Class focuses on analysis of contract drafting design for various types of transactions and actual transactional documents typically encountered.

**270S. Special Session International Business Transactions (2)**

Discussion—2 hours. A consideration of select legal problems arising from international business transactions. Topics include the international sales contract, letters of credit, transfers of technology, regulation of bribery, repatriation of profits, and national efforts to control imports.

**271. Nonprofit Organizations and Drafting (3)**

Discussion—4 hours. Prerequisite: course 215 or consent of instructor. Restricted to 13 students. Legal rules and concepts applicable to nonprofit organizations.

**271A. Nonprofit Organizations: State and Local Governance Issues (2)**

Discussion—2 hours. Prerequisite: course 215 (may be taken concurrently) or consent of instructor. State and local laws applicable to nonprofit organizations, i.e., public interest, cultural, religious, educational, and other not-for-profit entities. Federal tax exemptions of nonprofits, state and local laws impacting nonprofits with respect to incorporation or charitable trust formation, operation and governance, dissolution, fiduciary obligations of trustees and officers and directors, management and investment obligations vis-à-vis trust assets, cy pres, rights of members of social clubs, trade associations and labor unions, enforcement of obligations and rights by the attorney general and others, and regulation of charitable solicitation. Topics may include local property tax and other tax exemptions, nonprofit accounting issues public/private partnerships and Federal antitrust and constitutional constraints.

**271B. Nonprofit Organizations: Tax Exemptions and Taxation Focus (2)**

Discussion—2 hours. Prerequisite: course 215 or consent of instructor; course 220 recommended. Conceptual basis and substantive law criteria for the federal and state income tax exemption of nonprofit organizations and those particular circumstances and activities which will result in income taxation or financial sanction, including qualifications for exempt status, the nondistribution constraint, the inurement and private benefit concepts, limitations on campaign activities, permissible lobbying expenditures, the unrelated business income tax, the deduction for charitable contributions, intermediate sanctions, the differences between private foundations and public charities, special excise taxes, the exemption application process and reporting and disclosure requirements. Topics may include nonprofit accounting issues, local property tax and other local tax exemptions, and public/private partnerships.

**271T. Nonprofit Organizations-Key Legal Topics (2)**

Discussion—2 hours. Legal issues raised in operating and governing a nonprofit organization, primarily a public charity.

**272. Family Law (3)**

Discussion—3 hours. An introduction to the legal regulation of the family.

**273A. Education Policy and the Law (3)**

Discussion—3 hours. Topics include civil rights, inequality and the "right" to an education, bilingual education, school finance litigation, educational access, No Child Left Behind Act, Common Core Standards and charter schools. For students interested in educational policy and social regulatory policy.

**274. Intellectual Property (3)**

Discussion—3 hours. Provides a broad survey of intellectual property law.

**274A. International Intellectual Property and Development (2)**

Discussion—2 hours. In September 2007, the World Intellectual Property Organization adopted a development agenda that would rewrite that body's mandate, placing the concerns of the poor at the center of international intellectual property law and policy.

**274AS. Summer Session Intellectual Property (2)**

Discussion—2 hours. This course provides a broad survey of the field of intellectual property. Areas covered will include trademarks, patents, trade secrets, idea protection, unfair competition, and copyright.

**274BT. Law of Trade Secrets and Restrictive Covenants (2)**

Discussion—2 hours. Focus is on the law of trade secrets, including the Uniform Trade Secret Act (UTSA), restrictive covenants not to compete, and current case law developments in the areas of employee mobility and raids, and corporate espionage.

**274CT. Knowledge Commons, Collaborative Authorship, Open Access (2)**

Seminar—2 hours. Focuses on the increasingly global diffusion and success of collaborative forms of cultural and technoscientific production rooted in copyright-based licenses.

**274D. Intellectual Property in Historical Context Seminar (2)**

Seminar—2 hours. How the legal system has adapted to earlier periods of rapid change by creating, delimiting, and expanding intellectual property rights (IPRs). Required paper satisfies advanced writing requirement.

**274ET. Intellectual Property, Human Rights & Social Justice (2)**

Seminar—2 hours. Course will examine the implications of copyright and patents for a broad set of social justice values, with particular emphasis on the interaction between intellectual property law and human rights law on the global stage.

**274FT. Censorship in the Global Age (2)**

Seminar—2 hours. Course examines from a globalized perspective a broad range of censorship issues, drawing from established cases and practices. This seminar attempts to identify a globally consistent set of theories that have gained traction in relevant regional or international debates.

**274GT. Race, National Identity and Intellectual Properties (2)**

Seminar—2 hours. Drawing upon methods taken from critical race theory, critical/cultural studies, and rhetoric this course addresses the relationships between intellectual properties and processes racial/national identity formation in the US, particularly as exemplified in legal, popular cultural, and political texts.

**274T. Theory and History of Intellectual Property (2)**

Seminar—2 hours. Seminar traces development of intellectual property law in the U.S. and Europe because it is not possible to understand the logic and shape of current Intellectual Property concepts outside of their messy history.

**275. Complex Litigation (2)**

Discussion—2 hours. Issues that frequently arise in large complex litigation involving multiple parties and multiple claims.

**275TA. Intellectual Property Agreement Drafting for Biotech & Pharma**

Seminar—2 hours. Prerequisite: upper-division Business Law course or Intellectual Property course; priority given to students that have completed course 274. Covers the negotiation and drafting of intellectual property agreements common in the biotechnology and pharmaceutical arena.

**276. Juvenile Justice Seminar (2)**

Seminar—2 hours. Legal and philosophical bases of a separate juvenile justice process for crimes committed by minors; police investigation, apprehension, and diversion; probation intake and detention; juvenile court hearing and disposition; juvenile corrections. The role of counsel at each phase of the process is examined.

**277. Native American Law (3)**

Discussion—3 hours. Seminar focuses on legal relations between Native American tribes and the federal and state governments.

**277T. Indian Gaming Law Seminar (2)**

Seminar—2 hours. Examines unique historical, political and legal context in which Indian tribes operate casinos, including impacts on tribal sovereignty, relations between tribes, states and local governments and changing relationships among the tribes themselves members, with particular reference to experience of California.

**278. Pretrial Skills (2)**

Discussion—2 hours. Limited enrollment. This course uses role-playing exercises, videotaped simulations, and related projects to introduce students to lawyering skills basic to the practice of law, including client interviewing, witness interviewing and discovery, including depositions.

**279. Public Sector Labor Law (2)**

Seminar—2 hours. Limited enrollment. Prerequisite: course 251 or consent of instructor. Application of private sector labor law doctrines to the public sector. Emphasis on the four California public sector statutes and the impact of constitutional law on public employees. Class presentation and seminar paper required. Satisfies advanced writing requirement.

**280. Advanced Legal Writing: Analytical & Persuasive Writing (2)**

Seminar—2 hours. Prerequisite: consent of instructor. Develop essay writing skills and performance test drafting typically employed on the bar examination. (S/U grading only.)

**280AT. Legal Analysis (2)**

Discussion—2 hours. Selected enrollment by permission of professor; 2L's only. Focuses on skills critical to law school success, and ultimately, bar exam success. (S/U grading only.)

**280BT. Problem Solving and Analysis (2)**

Discussion—2 hours. Prerequisite: consent of instructor. Restricted to third-year Law students only. Skills focused on the development of legal analytical and organizational methods essential to successful completion of the Performance Test component of the California Bar Exam (and other states), and, by extension, to success in the practice of law. (S/U grading only.)

**281. Local Government Law (2)**

Discussion—2 hours. Broad approach to state and local government law, both practically and theoretically. Topics include: federalism, relations between states and localities, governmental liability, zoning, educational equity and public finance.

**282. Energy Law Seminar (2)**

Seminar—2 hours. The history, law, and public policy of energy regulation in the United States with an emphasis on economic and environmental regulation. Competitive restructuring of the natural gas and electric utility industries emphasized. The basic regulatory schemes for other energy sources such as hydroelectric power, coal, oil, and nuclear power explored. Recommended to anyone who has an interest in the energy sector, various models of economic regulation, or regulated industries.

**282AT. Renewable Energy Seminar (2)**

Seminar—2 hours. Seminar will provide a broad overview of renewable energy law and policy with a particular focus on the California policy and institutional context.

**283. Remedies (3)**

Discussion—2 hours. Survey of modern American civil remedies law in both private and public law contexts. Topics addressed include equitable remedies, equitable defenses, contempt power, injunctive relief, restitution, and money damages in torts and contracts.

**284. Law and Economics (4)**

Discussion—4 hours. Prior study of economics is not required. Introduces students to the economic analysis of law.

**285. Environmental Law (4)**

Discussion—4 hours. Introduction to environmental law, focusing primarily on federal law.

**285A. California Environmental Issues (2)**

Discussion—2 hours. The “nation-state” of California has for many years been a national and global leader in environmental law and policy. Survey of key California environmental law and policy issues.

**285B. Environmental Practice (2)**

Discussion—2 hours. Prerequisite: course 285 recommended. Examines underlying theory and practice in securing compliance with our major environmental laws.

**285BT. Food Justice (2)**

Seminar—2 hours. Focus on the law and policy of the emerging “food justice movement,” which combines the goals and principles of the environmental justice movement with some of the policy initiatives involved in “ethical consumption” and “sustainable agriculture” movements.

**285C. Food and Agricultural Law (3)**

Discussion—3 hours. Introduction to agricultural law, focusing on legal principles and issues at the forefront of contemporary debates about agriculture in society.

**285CT. The Business of Lawyering (2)**

Discussion—2 hours. Desired outcome is a thorough understanding of the business side of law practice and to promote an understanding of the relationship and balance between legal skills, business requirements of a practice, client needs and a work-life balance.

**285D. Farmworkers and the Law (2)**

Discussion—2 hours. Provides an overview of California and federal laws impacting farmworkers and how such laws have been applied to regulate working conditions in agriculture.

**285E. Climate Change Law and Policy (3)**

Discussion—3 hours. Addresses the legal and public policy dimensions of climate change, perhaps the most important environmental issue of our time.

**285F. Environmental Justice (2)**

Discussion—3 hours. Introduction to the field of environmental justice.

**285H. Comparative Environmental Law (2)**

Discussion—2 hours. Focus on Pacific Rim, examining factors, similarities/differences in countries environmental regulation and success of environmental law. Including information and market-based regulatory approaches; compliance and enforcement gaps; citizen and community mobilization; the role of legal institutions; variations in regulatory style.

**285T. Wine and the Law (2)**

Seminar—2 hours. Surveys the legal landscape of this multi-billion dollar industry, focusing on contemporary debates and developments in judicial, legislative, and administrative arenas.

**285TA. Environmental Law Seminar: Emerging Technologies and the Environment (2)**

Seminar—2 hours. Examines legal regimes that might apply to various emerging technologies and consider governance mechanisms and reforms that might enable more foresighted and participatory development and management of technology.

**286. Health Care Law (3)**

Discussion—3 hours. Addresses legal issues raised in general areas: access to health care and health care financing. Course materials and discussion focus on both public and private aspects of these issue areas. GE credit: WE.

**286A. Topical Issues in Health Law (2)**

Seminar—2 hours. Limited enrollment. The course focuses on four-six issues at the interface of law, medicine, bioethics, and health policy that are currently the subject of major litigation, legislation, and/or contentious debate in the domains of bioethics and public policy.

**286B. Public Health Law (2)**

Discussion—2 hours. Restricted to 15 students. Public health law, seen broadly, is the government's power and responsibility to ensure the conditions for the population's health.

**286C. Bioethics (3)**

Discussion—3 hours. Limited enrollment. Course examines the ethical and legal issues that arise from biomedical research and use of medical technologies. GE credit: Wrt.

**286D. Legal Psychology Seminar (2)**

Seminar—2 hours. Examines how psychological theory and research can be used to shape laws and policies to make them better reflect what we know empirically about how individuals process information, make decisions and behave.

**286E. Reproductive Rights, Law, and Policy (2)**

Seminar—2 hours. Limited enrollment. Addresses a variety of laws and practices that affect reproductive health and procreative decision making.

**287. Public Land Law (2)**

Discussion—2 hours. Legal aspects of federal land management, including the history of public land law, the scope of federal and state authority over the federal lands, and the allocation of public land resources among competing uses, including extractive consumption, recreation, and preservation.

**287A. Poverty Law (2)**

Seminar—2 hours. Limited enrollment. Explore the theory and practice of law pertaining to the enactment and enforcement of laws regulating or aiding the poor and other disadvantaged persons.

**287T. Law and Society Seminar (2)**

Seminar—2 hours. Limited enrollment. Study of law and society challenges traditional legal scholarship by exploring multiple ways in which law both

shapes and is shaped by societies and social interactions. Seminar will introduce students to important literature and debates in the field.

**288. Advanced Constitutional Law Seminar (2)**

Seminar—2 hours. Prerequisite: Prior or concurrent enrollment in course 218 or 218A. Limited enrollment. Explores in-depth selected topics or problems in constitutional law and theory. Current focus is on the interpretation and application of the religion clauses of the First Amendment.

**288B. Supreme Court Simulation Seminar (2)**

Seminar—2 hours. Limited enrollment. Consideration in depth of approximately nine cases involving constitutional law that will be decided during the present term of the U.S. Supreme Court.

**289A. Biotechnology Law and Policy (2)**

Seminar—2 hours. Limited enrollment. Coverage includes the regulation of biotechnology research, including restrictions on cloning and fetal stem cell research; regulation of the products of biotechnology to protect human health or the environment, including restrictions on use or distribution of genetically modified organisms; the availability and scope of intellectual property protection for biotechnology products, including genes and engineered organisms; and the international law governing access to the natural resources that provide the starting materials for biotechnology and trade in bioengineered organisms or their products.

**290AT. Privacy, Surveillance, and "Sousveillance" (3)**

Discussion—3 hours. Issues of privacy and surveillance are important to businesses, governments and citizens. Surveillance raises issues of autonomy and the abuse of power. “Sousveillance,” (citizen holds the camera), is a mechanism for rooting out corruption and exposing individuals to societal scrutiny.

**290BT. Surveillance and States (3)**

Seminar—3 hours. Examines the tensions between democracy and the rise of government power entailed by the growth of state surveillance, United States surveillance law and practice, and surveillance law and practice across the world. Also considers international legal constraints on government surveillance.

**290T. International Trade Law (4)**

Discussion—4 hours. Review existing landscape of trade regulation from the World Trade Organizations, to regional organizations such as NAFTA, ASEAN, and the European Union.

**291A. International Finance (3)**

Discussion—3 hours. How a framework of national and international laws and institutions regulates and fails to regulate the flow of money around the world.

**291B. International Investment Dispute Seminar (2)**

Seminar—2 hours. This seminar will examine the law of investor-State dispute resolution.

**292. Immigration Law and Procedure (3)**

Discussion—3 hours. Surveys the history of U.S. immigration law and policy.

**292T. Advanced Topics in Immigration and Citizenship Law Seminar (2)**

Seminar—2 hours. Conducts a closer examination of various topics and subject matters that relate to immigration and citizenship law.

**293. Public Interest Law Seminar (2)**

Seminar—2 hours. This class will examine the issues and problems associated with providing civil legal services to persons and interests in American society that typically have been unable to afford or otherwise obtain representation from the private bar.

**293AT. Contemporary Issues in Economic Justice (2)**

Discussion—2 hours. Provides an introduction to the social justice critique of free markets.

**293T. Public Interest Lawyering, Civil Rights and Employment Law (2)**

Seminar—2 hours. Prerequisite: course 260; 260AT. Advanced course covers employment law issues through the lens of public interest lawyers and their constituencies.

**294A. Law and Popular Culture (2)**

Seminar—2 hours. This course examines works of popular culture, films, and legal texts. Each session will focus on a particular film and its cultural implications, particular problem or problems of law, law practice, legal ethics, traditional ethics, or public policy.

**295A. Trademark and Unfair Competition Law (2)**

Discussion—2 hours. Prerequisite: course 274 recommended, not required. Intensive look at selected issues in Trademark Law, including the concepts of trademarks and unfair competition, acquisition and loss of trademark rights, infringement, trademarks as speech, and international aspects of trademark protection.

**295T. Brands and Trademarks (2)**

Seminar—2 hours. Explores the challenges brands pose to traditional trademark law. Taking a close, interdisciplinary look at branding: from the business schools' theories of brand management to semiotic analyses of brand meaning to art criticism of brand advertisements.

**296. Copyright (3)**

Discussion—3 hours. Thorough examination of the law of copyright, including its application to literature, music, films, television, art, computer programs, and the Internet.

**296T. Entertainment Law (2)**

Discussion—2 hours. Explores the many facets of Entertainment Law.

**297. Alternative Dispute Resolution (3)**

Discussion—3 hours. Limited enrollment. Introduces students to a wide variety of alternative dispute resolution procedures, with an emphasis on negotiation, mediation and arbitration.

**297A. Federal Arbitration Act Seminar (2)**

Seminar—2 hours. Trace the development of commercial arbitration law, with a special emphasis on hot-button contemporary issues like consumer and employment arbitration, the separability doctrine, preemption of state law, and the arbitrability of statutory claims.

**297BT. International Commercial Arbitration (3)**

Discussion—3 hours. International commercial arbitration, Convention on International Sale of Goods, general understanding of international arbitration provided by World Bank's International Centre for Settlement of Investor-State Disputes under Convention on Settlement of Investment Disputes between States and Nationals of Other States.

**298. Sociology of the Legal Profession Seminar (2)**

Seminar—2 hours. Limited enrollment. Comprehensive look at the organization, operation, and ideology of the legal profession.

**400A. Study Abroad—University College Dublin, Ireland (12)**

Independent study. Students must apply and be accepted into the International Study Abroad Program. Semester away study abroad at the University College Dublin, Ireland. Enhance knowledge of international legal regimes and obtain a global legal educational experience. (S/U grading only.)

**400B. Study Abroad—University of Copenhagen, Denmark (12)**

Independent study. Students must apply and be accepted into the International Study Abroad Program. Semester study abroad at the University of Copenhagen, Denmark. Enhance knowledge of international legal regimes and obtain a global legal educational experience. (S/U grading only.)

**400C. Study Abroad—China University of Political Science and Law (12)**

Independent study. Students must apply and be accepted into the International Study Abroad Program. Semester-away study abroad at the China University of Political Science and Law. Enhance knowledge of international legal regimes and obtain a global legal educational experience.

**400D. Study Abroad—University of Lausanne, Switzerland (12)**

Independent study. Student must apply and be accepted in the International Study Abroad Program. Semester-away study abroad at the University of Lausanne, Switzerland. Enhance knowledge of international legal regimes and obtain a global legal educational experience. (S/U grading only.)

**400S. Critical Topics in Environmental Law in a Comparative Perspective (2)**

Seminar—2 hours. Enrollment by application only. Intensive, two-week program provides an opportunity for U.S. and international law students to study environmental law by examining and comparing European Union and U.S. environmental law policies and regulatory regimes. (S/U grading only)

**408. Community Education Seminar (3)**

Seminar/clinic—3 hours. Limited enrollment. Trains students to educate the community about basic legal rights and responsibilities. Students attend an initial four-hour orientation, followed by weekly seminars that will prepare students to teach in a local high school at least two times per week. Paper or journal required, to be determined by instructor. (S/U grading only.)

**409. Environmental Law Moot Court Competition (1)**

During the first eight weeks of fall semester, students research and submit briefs as appellants, respondents, or third parties on a problem of environmental law that is prepared by the National Environmental Law Moot Court Board. Students attend four to six classes (including guest lectures) on aspects of appellate advocacy, legal writing, and environmental law. Members of the spring environmental law moot court team will be selected on the basis of performance in class. (S/U grading only.)

**410A. Appellate Advocacy I (2)**

Discussion/laboratory. Limited enrollment. Basic appellate practice and procedure. Beginning instruction in oral advocacy skills and an opportunity to practice these skills in front of a moot court. (S/U grading only.)

**410B. Appellate Advocacy II (Moot Court) (2)**

Practice—2 hours. Limited enrollment. Continuation of course 410A. Focuses on the development of effective appellate brief writing skills and the refinement of oral advocacy skills. (S/U grading only.)

**411. Journal of International Law and Policy (1-2)**

The Journal is a biannual journal produced by King Hall students with an interest in international law. The editor-in-chief of the journal receives two units of credit each semester. The managing editor receives one unit of credit each semester. (S/U grading only.)

**411A. International Law Journal (1-2)**

The Editor in Chief of the Journal of International Law and Immigration receives two credits for each semester of service. Only one person may receive this credit in any one semester as editor in chief. Managing and executive editors receive one unit. (S/U grading only.)

**411B. Journal of Juvenile Law and Policy (1-2)**

A biannual publication of the UC Davis School of Law that addresses the unique concerns of children in the American legal system. The editor-in-chief of the journal receives two credits each semester. Managing editors receive two credit each semester. (S/U grading only.)

**411C. UC Davis Business Law Journal (1-2)**

Run by dedicated law students who are committed to providing current and valuable legal and business analysis. The Journal addresses a broad spectrum of issues that fall within the intersection of business and the law. May be repeated two times for credit. (S/U grading only.)

**412. Carr Intrachool Trial Advocacy Competition (1)**

Lecture. Limited enrollment. Named after the late Justice Frances Carr, this competition is open to second- and third-year students. A preliminary round is followed by quarter-finals, semi-finals, and a final round. Students participate in mock trials presided over by judges and critiqued by experienced litigators. (S/U grading only.)

**413. Interschool Competition (1-3)**

Prerequisite: consent of appropriate faculty adviser. Participation in interschool moot court and lawyering skills competitions. Enrollment is limited to students actually representing the School in the interschool competitions. Competition must be authorized by the appropriate faculty adviser. The faculty adviser may condition the award of academic credit for any particular competition on the performance of such additional work as may be reasonable to justify the credit. May satisfy advanced legal writing requirement. (S/U grading only.)

**414. Moot Court Board (1)**

Prerequisite: courses 410A-410B. Limited enrollment. Members of Moot Court Board may receive one credit for each semester of service on the board, up to maximum of two. Credit awarded only after certification by Moot Court Board and approval of the faculty advisers to Moot Court Board. (S/U grading only.)

**414A. Negotiations Board (1)**

Variable—1 hour. Prerequisite: consent of instructor. Members of the King Hall Negotiations Board assist in the administration of the King Hall Negotiation Team by performing a variety of tasks under the supervision of the course instructor. One unit of credit for each semester of service on the board, up to a maximum of two units per academic year. Credit is awarded only after approval by the instructor. (P/NP grading only.)

**415. Trial Practice Honors Board (1)**

Members of the Trial Practice Honors Board administer the Frances Carr competition. Members are nominated by their individual Trial Practice I adjuncts. Students receive one credit for serving on the Board, awarded upon approval of the faculty adviser. (S/U grading only.)

**416. Law Review Writer (1-3)**

The writing of a law review article under the editorial supervision of editors of the UC Davis Law Review. Office hours (including but not limited to Bluebooking and cite-checking) are required. 1 or 2 units, maximum 3 total units. In the spring semester, credit is obtained only upon achieving status as a member of the UC Davis Law Review, which requires that the student has made substantial progress towards completing an editorship article. Credit is awarded only after certification by the editor in chief and approval of the faculty advisers. One unit of credit is earned the first semester. Two units are earned the second semester upon nomination and acceptance of nomination to the Editorial Board. One unit is earned second semester if only a membership draft and office hours are completed. May be repeated for credit. (S/U grading only.)

**417A. Law Review Editor (1-2)**

Prerequisite: consent of instructor. Editors must have completed an editorship article and must perform editorial duties (a substantial time commitment). Credit is awarded only after completion of both semesters. (S/U grading only; deferred grading only, pending completion of sequence.)

**417B. Law Review Editor (1-2)**

Prerequisite: consent of instructor. Editors must have completed an editorship article and must perform editorial duties (a substantial time commitment).

Credit is awarded only after completion of both semesters. (S/U grading only; deferred grading only, pending completion of sequence.)

#### **418. Environmental Law and Policy Journal (1-2)**

Independent study. Each year nearly 100 King Hall students work together to publish Enviros. Getting involved with the journal will provide you with the chance to develop essential skills that will benefit you throughout school and career. (S/U grading only.)

#### **419. Advanced Writing Project (1-4)**

The completion of a writing requirement project under the active and regular supervision of a faculty member in satisfaction of the legal writing requirement. The writing project must be an individually authored work of rigorous intellectual effort of at least 20 typewritten double-spaced pages, excluding footnotes. The project may take any of several forms, for example, a paper, a brief, a memorandum of law, a proposed statute, a statutory scheme or set of administrative regulations (with explanatory comments), or a will or agreement (with explanatory comments). The advanced writing project may also be undertaken in connection with another course or seminar to satisfy the legal writing requirements. The number of units shall be approved by the faculty supervisor and will depend upon the scope of the writing effort. (S/U grading only.)

#### **419A. Advanced Writing Project (1-4)**

The completion of a writing requirement project under the active and regular supervision of a faculty member in satisfaction of the legal writing requirement. The writing project must be an individually authored work of rigorous intellectual effort of at least 20 typewritten double-spaced pages, excluding footnotes. The project may take any of several forms, for example, a paper, a brief, a memorandum of law, a proposed statute, a statutory scheme or set of administrative regulations (with explanatory comments), or a will or agreement (with explanatory comments). The advanced writing project may also be undertaken in connection with another course or seminar to satisfy the legal writing requirements. The number of units shall be approved by the faculty supervisor and will depend upon the scope of the writing effort. (S/U grading only.)

#### **419S. Special Session Advanced Writing Project (1-4)**

The completion of a writing requirement project under the active and regular supervision of a faculty member in satisfaction of the legal writing requirement. The writing project must be an individually authored work of rigorous intellectual effort of at least 20 typewritten double-spaced pages, excluding footnotes. The project may take any of several forms, for example, a paper, a brief, a memorandum of law, a proposed statute, a statutory scheme or set of administrative regulations (with explanatory comments), or a will or agreement (with explanatory comments). The advanced writing project may also be undertaken in connection with another course or seminar to satisfy the legal writing requirements. The number of units shall be approved by the faculty supervisor and will depend upon the scope of the writing effort. (S/U grading only.)

#### **420. Civil Rights Clinic (2-6)**

Clinical activity—2 hours. Prerequisite: prior or concurrent enrollment in course 219; priority given to students enrolled in or have taken course 267; consent of instructor. Limited enrollment. Clinic provides practical experience in providing legal services to indigent clients who have filed civil rights actions in state and federal trial and appellate courts. Students work on clinic cases under the supervision of the clinic director. May be repeated for credit.

#### **425. Judicial Clinical (2 to 6 or 12)**

Clinical program. Prerequisite: course 261 required for full-time clinical students and recommended for part-time clinical students. Students may arrange judicial clerkship clinical programs with an approved list of state and federal judges through the

Clinical office and under the sponsorship of the faculty member in charge. All students must complete weekly time records and bi-weekly journals. Full-time clinical students must complete an evaluative final paper of approximately 10 pages. (S/U grading only.)

#### **430. Federal and State Taxation Externship (2-6)**

Clinical activity—2-12 hours. Prerequisite: course 220. Students will have the opportunity to work with the Internal Revenue Service or other governmental tax agency. Journals and attendance at group meetings are required. (S/U grading only.)

#### **435. Family Protection Clinic (4)**

Clinical activity—2 hours. Prerequisite: Full-Year Clinic: prior or concurrent enrollment in course 219 to qualify for state court certification; prior or concurrent enrollment in course 272 and 263A recommended, not required; One-Semester Clinic: prior or concurrent enrollment in course 272 and 263A recommended, not required. Full-Year Clinic: each student required to enroll for two semesters, receiving four units each semester for total of eight units; class limited to seven students; One-Semester Clinic: each student required to meet weekly for a 2-hour seminar; class limited to four students. Represent low-income persons in family law and related matters arising out of situations involving family violence.

#### **435A. Family Protection Clinic (4)**

Clinical activity—2 hours. Prerequisite: Full-Year Clinic: prior or concurrent enrollment in course 219 to qualify for state court certification; prior or concurrent enrollment in course 272 and 263A recommended not required; One-Semester Clinic: prior or concurrent enrollment in course 272 and 263A recommended not required; consent of instructor. Full-Year Clinic: each student required to enroll for two semesters receiving four units each semester for total of eight units; class limited to seven students. Represent low-income persons in family law and related matters arising out of situations involving family violence. (Deferred grading only, pending completion of sequence.)

#### **435B. Family Protection Clinic (4)**

Clinical activity—2 hours. Prerequisite: Full-Year Clinic: prior or concurrent enrollment in course 219 to qualify for state court certification; prior or concurrent enrollment in course 272 and 263A recommended not required; consent of instructor. Full-Year Clinic: each student required to enroll for two semesters receiving four units each semester for total of eight units; class limited to seven students. Represent low-income persons in family law and related matters arising out of situations involving family violence. (Deferred grading only, pending completion of sequence.)

#### **440. Immigration Law Clinic (4)**

Clinical Activity—8 hours. Starting in Fall 2011, the Immigration Clinic is a full-year clinic; each student required to enroll for two semesters, receiving four units each semester for total of eight units; prior or concurrent enrollment in courses 292 and 219, recommended, not required. Each student is required to enroll for two semesters, receiving four units each semester for total of eight units. Provides legal representation to indigent non-citizens in removal proceedings before U.S. Immigration Courts, the Board of Immigration Appeals, and federal courts, including the Ninth Circuit Court of Appeals. (S/U grading only; deferred grading only, pending completion of sequence.)

#### **440A. Immigration Law Clinic (4)**

Clinical Activity—4 hours. Prerequisite: prior or concurrent enrollment in course 292. Each student is required to enroll for two semesters, receiving four units each semester for total of eight units. Provides legal representation to indigent non-citizens in removal proceedings before U.S. Immigration Courts, the Board of Immigration Appeals, and federal courts, including the Ninth Circuit Court of Appeals. (Deferred grading only, pending completion of sequence.)

#### **440B. Immigration Law Clinic (4)**

Clinical Activity—4 hours. Prerequisite: prior or concurrent enrollment in course 292; consent of instructor. Each student is required to enroll for two semesters, receiving four units each semester for total of eight units. Provides legal representation to indigent non-citizens in removal proceedings before U.S. Immigration Courts, the Board of Immigration Appeals, and federal courts, including the Ninth Circuit Court of Appeals. (Deferred grading only, pending completion of sequence.)

#### **445. Legislative Process Externship (2-5)**

Clinical activity. Prerequisite: course 240 (may be taken concurrently) or consent of instructor. Practical experience in the operation of the office of a legislator or a legislative committee. The major thrust of the program is to enable students to become familiar with the give and take realities of making laws, as contracted with their interpretation and enforcement. Journals are required. (S/U grading only.)

#### **450. Environmental Law Externship (2-6)**

Clinical activity—2-6 hours. Prerequisite: course 285 or consent of instructor. Practical experience in environmental law. Students will work in an approved government, non-profit or private law office engaged in some form of environmental law work for a minimum of 8 hours per week. Students must prepare a journal describing and reflecting upon their clinical experience, and meet periodically with the instructor.

#### **455. Employment Relations Externship (2-6)**

Clinical activity. Prerequisite: course 251 or 260 (may be taken concurrently). Practical experience in employment relations, including employment discrimination and public sector labor law. Work under the direct supervision of a government lawyer. Opportunity to participate in a range of with emphasis on observation and participation in actual investigation, interviewing, drafting pleadings, and attendance at hearings. (S/U grading only.)

#### **460. Public Interest Law Clinical (2-6)**

Clinical activity. Prerequisite: prior or concurrent enrollment in course 293 recommended. Students work with a public interest practitioner in a nonprofit organization. Journals and attendance at two group meetings are required. Clinical students must complete an evaluative final paper of approximately 8 pages. Hours completed in public interest setting may be applied toward the practicum requirement for the Public Interest Law Program. (S/U grading only.)

#### **465. Intellectual Property Externship (2-6)**

Clinical activity. Prerequisite: course 293 and Comparative Public Services recommended. Opportunity to work for government, academic, and nonprofit entities. (S/U grading only.)

#### **470. Administration of Criminal Justice Externship (2-12)**

Clinical activity—2-12 hours. Prerequisite: completion of, or concurrent enrollment, in courses 219 and 227; course 263A recommended. Limited enrollment. Gain practical experience working full or part time in a District Attorney's or Public Defender's office in one of several surrounding counties or in a federal Public Defender or U.S. Attorney's office. Students participate in the many activities associated with the office for which they extern: observation, interviewing, research, counseling, motion practice, and trials under State Bar rules. May be repeated up to 12 units for credit. (S/U grading only.)

#### **475. Washington UC-DC Law Program (10)**

Clinical activity—10 hours. Open to 2L and 3L students. Uniquely collaborative externship program in Washington, D.C., combining weekly seminars with full-time field placement offering students an unparalleled opportunity to learn how federal statutes, regulations, and policies are made, changed, and understood in the nation's capital. (S/U grading only.)

#### **475A. Law Making and Law Changing in the Nation's Capital (3)**

Seminar—3 hours. Companion seminar to the Washington UC-DC Externship. Designed to enhance the externship experience in three principal ways.

#### **480. Clinical Program in Prison Law (2-6)**

Clinical Activity—2 hours. Prerequisite: consent of instructor. Provides practical experience in providing legal services to real clients who have various problems related to their incarceration in state prison. The services require analysis and application of Constitutional Law, state statutory law, agency regulations, and the rules of professional responsibility.

#### **485. California Supreme Court Clinic (6)**

Clinical activity—6 hours. Class size limited to 6 students. California Supreme Court Clinic provides students with an immersive experience in litigating cases before the state's highest court.

#### **490T. Aoki Federal Public Defender Clinic (4)**

Clinical activity—4 hours. Students submit applications for the course. Outgrowth of the work of the Aoki Center on Race and Nation. As part of its work, the Aoki Center provides educational opportunities to students interested in critical race perspectives in practice.

#### **495. Legal Research and Writing I (2)**

Discussion—2 hours. Integrated legal research and writing skills course. Basic legal research resources and strategies are introduced and practiced. (S/U grading only.)

#### **498. Group Study (1-4)**

Prerequisite: consent of instructor. Groups of students with common interest in studying a stated legal problem may plan and conduct their own research and seminar program under the direction of faculty. Class size limited to no fewer than 4 or more than 10 students. (S/U grading only.)

#### **498A. Group Study (1-4)**

Prerequisite: consent of instructor. Groups of students with common interest in studying a stated legal problem may plan and conduct their own research and seminar program under the direction of faculty.

#### **499. Independent Research Project (1-4)**

Students may receive credit for individual projects, subject to the following regulations: (1) the project may extend over no more than two semesters; (2) each project will be under the supervision of a faculty member; (3) an outline of the project must be approved by the supervising faculty member; (4) normally, no faculty member will be permitted to supervise more than five students working on individual programs during any semester; and (5) each student must submit an individual paper or approved alternative to the supervising faculty member. (S/U grading only.)

#### **499A. Independent Research Project (1-4)**

Students may receive credit for individual projects, subject to the following regulations: (1) the project may extend over no more than two semesters; (2) each project will be under the supervision of a faculty member; (3) an outline of the project must be approved by the supervising faculty member; (4) normally, no faculty member will be permitted to supervise more than five students working on individual programs during any semester; and (5) each student must submit an individual paper or approved alternative to the supervising faculty member. Grading is on a Satisfactory/Unsatisfactory basis unless a request for letter grading has been made in advance.

#### **499B. Law Students Study Away (10)**

Independent study. Students studying away from UC Davis, School of Law. (S/U grading only.)

#### **499C. Joint Degree Student-GSM (10)**

Joint degree course for graduate School of Management students. (S/U grading only.)

#### **499S. Special Independent Research Project (1-4)**

Students may receive credit for individual projects, subject to the following regulations: (1) the project may extend over no more than two semesters; (2) each project will be under the supervision of a faculty member; (3) an outline of the project must be approved by the supervising faculty member; (4) normally, no faculty member will be permitted to supervise more than five students working on individual programs during any semester; and (5) each student must submit an individual paper or approved alternative to the supervising faculty member.

#### **499SA. Special Session Independent Research Project (1-4)**

Students may receive credit for individual projects, subject to the following regulations: (1) the project may extend over no more than two semesters; (2) each project will be under the supervision of a faculty member; (3) an outline of the project must be approved by the supervising faculty member; (4) normally, no faculty member will be permitted to supervise more than five students working on individual programs during any semester; and (5) each student must submit an individual paper or approved alternative to the supervising faculty member. (Deferred grading only, pending completion of sequence.)

#### **499SB. Special Session Independent Research Project (1-4)**

Students may receive credit for individual projects, subject to the following regulations: (1) the project may extend over no more than two semesters; (2) each project will be under the supervision of a faculty member; (3) an outline of the project must be approved by the supervising faculty member; (4) normally, no faculty member will be permitted to supervise more than five students working on individual programs during any semester; and (5) each student must submit an individual paper or approved alternative to the supervising faculty member.

## Linguistics

(College of Letters and Science)

Vaidehi Ramanathan, Ph.D., Chairperson of the Department

**Department Office.** 469 Kerr Hall  
530-752-0966; <http://linguistics.ucdavis.edu>

#### **Faculty**

Raúl Aranovich, Ph.D., Associate Professor  
Santiago Barreda, Ph.D., Assistant Professor  
Robert J. Bayley, Ph.D., Professor  
David Corina, Ph.D., Professor  
Patrick Farrell, Ph.D., Professor  
John A. Hawkins, Ph.D., Professor  
Julia Menard-Warwick, Ph.D., Associate Professor  
Almerindo E. Ojeda, Ph.D., Professor  
Vaidehi Ramanathan, Ph.D., Professor  
Georgia Zellou, Ph.D., Assistant Professor

#### **Emeriti Faculty**

Wilbur A. Benware, Ph.D., Professor Emeritus  
Maria I. Manoliu, Ph.D., Professor Emerita  
David L. Olmsted, Ph.D., Professor Emeritus  
Mary Schleppegrell, Ph.D., Professor Emerita  
Gwendolyn Schwabe, M.A., Senior Lecturer Emerita  
Maximo Torreblanca, Ph.D., Professor Emeritus  
Lenora A. Timm, Ph.D., Professor Emerita

#### **Affiliated Faculty**

James L. Davis, M.A., Lecturer  
Janet Lane, M.A., Lecturer

#### **The Major Program**

Linguistics is the systematic study of human language. It focuses on theories of language structure, variation, and use, description of contemporary languages, and the examination of language change through time. Because of the pervasive influence of language in our everyday lives, work in linguistics

interacts in important ways with studies carried out in many other fields, including psychology, anthropology, neuroscience, philosophy, computer science, sociology, literature, language teaching, communication and education.

**The Program.** An introductory lower division course provides students with basic concepts and some of the methods needed to analyze language in a systematic way. Upper division courses probe more deeply into specific aspects of language structure, language use, and the relationship of language to other realms of human activity.

**Career Alternatives.** Majors in linguistics find practical outlets for their linguistic training in a variety of fields: the computer science industry (software development); teaching English as a second language; foreign language teaching; elementary and secondary level bilingual-bicultural programs; language-oriented missionary work; bilingual-bicultural curriculum development (e.g., for publishing houses); legal work; speech therapy; lexicography (preparation of dictionaries). All of these types of employment share an interest in persons skilled in the analysis of language, spoken and/or written. Linguistics equips students with just such skills.

#### **A.B. Major Requirements:**

	UNITS
<b>Preparatory Subject Matter .....</b>	<b>4-24</b>
Linguistics 1.....	4
Foreign language, one course beyond the 15-unit requirement of the College of Letters and Science in the same language used to fulfill the college requirement .....	0-20
<b>Depth Subject Matter .....</b>	<b>44</b>
Linguistics 103A, 103B, 111, 131 .....	16
Any three Linguistics courses from among those numbered from 110 to 159 .....	12
One Linguistics course from among those numbered from 160 to 169 .....	4
One Linguistics course from among those numbered from 170 to 189 .....	4
At least eight upper division units from the following courses .....	8
Requirements listed above, African American and African Studies 156, Anthropology 110, 117, 119, 120, Communication 105, Education 151, English 105, 106 French 109, 160, 161, 162, German 105, Human Development 101, Native American Studies 107, Philosophy 137A, 137B, 137C, Psychology 132, Spanish 111N, 112N, 113, 114N, 115, 115S, 116, 117, 118.	
<b>Total Units for the Major.....</b>	<b>48-68</b>
<b>Major Adviser.</b> G. Zellou	
<b>Minor Program Requirements:</b>	
Linguistics offers two minor programs:	
(1) <b>General Linguistics</b> , which provides the student with basic knowledge of language structure and linguistic analysis;	
(2) <b>Linguistics for Language Teachers</b> , which especially complements the major in English with the Teaching Area of emphasis; it is also of relevance to students interested in teaching foreign languages.	
	UNITS
<b>General Linguistics .....</b>	<b>24</b>
Linguistics 1, 103A, 103B .....	12
One course from: Linguistics 111, 112, 121, 131, 141, 151, 152 .....	4
Additional units selected from upper division Linguistics courses and other upper division courses listed in the major requirements in consultation with an adviser .....	8
<b>Linguistics for Language Teachers .....</b>	<b>24</b>
Linguistics 1, 106, 165.....	12
English 105.....	4
Linguistics 160 or 163.....	4
Linguistics 173 or Education 151 .....	4
<b>Minor Adviser.</b> Same as Major adviser	

Fall 2011 and on Revised General Education (GE): AH=Arts and Humanities; SE=Science and Engineering; SS=Social Sciences;

ACGH=American Cultures; DD=Domestic Diversity; OL=Oral Skills; QL=Quantitative; SL=Scientific; VL=Visual; WC=World Cultures; WE=Writing Experience

Pre-Fall 2011 General Education (GE): ArtHum=Arts and Humanities; SciEng=Science and Engineering; SocSci=Social Sciences; Div=Domestic Diversity; Wrt=Writing Experience

Quarter Offered: F=Fall, W=Winter, S=Spring, Su=Summer; 2017-2018 offering in parentheses

**Grading Recommendation.** Though not required, it is recommended that all courses offered in satisfaction of the Linguistics major be taken for a letter grade.

**Honors and Honors Program.** The honors program consists of six units of 194H credit normally taken in the fall and winter quarters of the senior year. Completion of the program is a prerequisite for High or Highest Honors at graduation. Specific eligibility criteria may be obtained from the major adviser. For general information regarding graduation with honors and Dean's Honors Lists, please see [Academic Information, on page 83](#).

**Graduate Study.** The Linguistics Graduate Group offers study and research leading to the M.A. and Ph.D. degrees. Please see [Linguistics \(A Graduate Group, on page 409\)](#); more detailed information may be obtained from the Graduate Adviser or from the Chairperson of the Linguistics Group.

**Graduate Adviser.** R. Bayley

## Courses in Linguistics (LIN)

### Lower Division

#### 1. Introduction to Linguistics (4)

Lecture—3 hours; discussion—1 hour. Introduction to the study of language; its nature, diversity, and structure. GE credit: ArtHum or SocSci, Wrt | AH, SS.—F, W, S. (F, W, S.)

#### 1Y. Introduction to Linguistics (4)

Web Virtual Lecture—3 hours; discussion—1 hour. Introduction to the study of language; its nature, diversity, and structure. GE credit: ArtHum or SocSci, Wrt | AH or SS.—F, W, S. (F, W, S.)

#### 5. Global English and Communication (4)

Lecture—2 hours; discussion—2 hours. English as a global language and its uses in intercultural communication. Cultural, historical, and political dimensions of varieties of English spoken around the world. Experiential grounding in strategies for increasing interpretive and verbal communicative competence for a globalized world. (Same course as Communication 5.) GE credit: ArtHum or SocSci | AH or SS, OL, WC.—W. (W.) Farrell, Ramanathan, Menard-Warwick

#### 6. Language and Society (4)

Lecture—3 hours; discussion—1 hour. Language as a social phenomenon. Topics include linguistic diversity, language policy, language and identity, language and social structure, speech communities and social networks, the effect of social factors on language variation, linguistic consequences of language contact. GE credit: SocSci, Div, Wrt | ACGH, DD, SS, WE.—W. Bayley, Ramanathan

#### 15. Academic Oral Communication (3)

Lecture—1 hour; discussion—2 hours. Structure of oral communication, critical thinking, and persuasion in classroom discourse in American English and in cross-cultural perspective. GE credit: ArtHum or SocSci | AH or SS, OL.—F, W, Su. (F, W, Su.) Takao-glu

#### 20. Oral English for Undergraduate ESL Students (3)

Lecture/discussion—3 hours. Open to non-native speakers of English with priority enrollment to international teaching assistants with qualifying placement exam scores. Intensive practice in oral English for undergraduate ESL students. Students will learn to identify and modify features of their pronunciation which limit their ability to communicate clearly. Students will also learn and practice strategies for effective participation in academic tasks. May be repeated for credit. (P/NP grading only.)—W, S. (W, S.)

#### 24. English Structures and Strategies in Academic Writing (4)

Lecture/discussion—4 hours. Prerequisite: course 23. Open to students from language backgrounds other than English. Practice in academic writing designed to prepare undergraduate students from language backgrounds other than English for successful academic work. Development of academic

writing, critical thinking, and reading skills. Development of clear, accurate language for presenting an effective argument.

#### 25. English for International/ESL Graduate Students (4)

Lecture/discussion—4 hours. Prerequisite: admission by placement examination or consent of coordinator; open to international and ESL graduate students and limited status international undergraduates (Education Abroad Program participants). Multi-skills ESL course designed to help international/ESL students improve their English language skills for successful academic study. Emphasis on writing, speaking, listening, reading, and academic culture. (P/NP grading only.)—F. (F.) Lane

#### 26. Writing for International Graduate Students (3)

Lecture—3 hours. Prerequisite: satisfactory completion of course 25 if held for it, or consent of instructor. Admission limited to international graduate students. Focuses on writing needed for academic work, including summaries, critiques, research and grant proposals, memos, resumes, and research papers. Includes a review of grammar needed for writing and some focus on reading skills and American vocabulary and idioms. (P/NP grading only.)—W. (W.)

#### 27. Academic Writing for ESL Students (4)

Lecture/discussion—4 hours. Writing skills necessary for upper division courses, including skills crucial to writing lab and project reports, summaries, critiques, abstracts, and responses to exam questions. Includes practice with the syntax, grammar, and vocabulary characteristic of academic writing. Offered irregularly.—F. (F.)

#### 28. Reading in Scientific and Technical Subjects for ESL Students (4)

Lecture/discussion—4 hours. Instruction and practice in reading scientific and technical texts. Techniques for comprehending and analyzing grammatical and organizational patterns. Notetaking skills, summarizing, vocabulary enrichment. (P/NP grading only.)

#### 96. Directed Group Study in English as a Second Language (1-5)

Variable—1.5 hours. Prerequisite: consent of instructor. Directed group study of topic in English as a Second Language (ESL). May be repeated for credit by consent of the ESL coordinator. (P/NP grading only.)—F, W, S. (F, W, S.)

#### 98. Directed Group Study (1-5)

Prerequisite: consent of instructor. Intended for lower division students. (P/NP grading only.)—F, W, S. (F, W, S.)

#### 99. Special Study for Undergraduates (1-5)

Prerequisite: consent of instructor. Intended for lower division students. (P/NP grading only.)—F, W, S. (F, W, S.)

### Upper Division

#### 103A. Linguistic Analysis I: Phonetics, Phonology, Morphology (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Introduction to fundamental methods and concepts used in linguistic analysis, focusing on phonetic, phonological, and morphological phenomena. Emphasizes development of analytical skills and appreciation of structural regularities and differences among languages. Not open for credit to students who have completed course 139. GE credit: ArtHum | AH.—F. (F.) Barreda, Zellou

#### 103B. Linguistic Analysis II: Morphology, Syntax, Semantics (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Introduction to fundamental methods and concepts used in linguistic analysis, focusing on morphological, syntactic, and semantic phenomena. Emphasizes development of analytical skills and appreciation of structural regularities and differences among languages. Not open for credit to students who have completed course 140. 103B GE credit: ArtHum | AH.—W. (W.) Aranovich, Farrell

#### 105. Topics in Language and Linguistics (4)

Lecture—3 hours; term paper. Prerequisite: course 1 recommended; consent of instructor. Detailed examination of a major contemporary linguistic theory, a major contemporary issue or related set of issues in linguistics, or the structure of a particular language or language family. May be repeated for credit when topic differs. Offered in alternate years.—S. (S.)

#### 106. English Grammar (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or English 3 or University Writing Program 1 or consent of instructor. Survey of present-day English grammar as informed by contemporary linguistic theories. The major syntactic structures of English; their variation across dialects, styles, and registers; their development; and their usefulness in describing the conventions of English. (Same course as English 106 and University Writing Program 106.) GE credit: ArtHum | AH.

#### 111. Introduction to Phonological Theory (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 103A recommended. Contemporary phonological theory with emphasis on syllable structure, metrical structure, phonology-morphology interaction, and typological variation in these areas, from the perspective of optimality-theoretic approaches. GE credit: ArtHum | AH.—W. (W.) Barreda, Zellou

#### 112. Phonetics (4)

Lecture—3 hours; term paper. Prerequisite: course 1. Detailed examination of articulatory and acoustic phonetics. GE credit: SciEng | SE.—F. (F.) Barreda, Zellou

#### 121. Morphology (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 103A, 103B. Introduction to the analysis of word structure and the relation of word structure to the lexicon and other grammatical components. GE credit: ArtHum | AH.—S. (S.) Aranovich

#### 127. Text Processing and Corpus Linguistics (4)

Lecture—3 hours; extensive problem solving. Prerequisite: course 1, course 5, course 6, or Anthropology 4. Investigation of the lexical organization of human languages through corpus linguistics. Application of principles of linguistic analysis, automatic text processing, and statistical research to solving problems of textual evaluation and classification, as well as information retrieval and extraction. Offered in alternate years. GE credit: ArtHum or SocSci | AH or SS, QL.—S. (S.) Aranovich

#### 131. Introduction to Syntactic Theory (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 103B. Introduction to syntactic theory, primarily through the examination of a major theory of syntax, emphasizing theoretical reasoning, argumentation, and problems of theory building in syntax. GE credit: ArtHum | AH.—F. (F.) Aranovich, Farrell

#### 141. Semantics (4)

Lecture—3 hours; term paper. Prerequisite: course 103B. The linguistic study of meanings of words and phrases. Meanings expressed by lexical items and derivational and inflectional morphology. Contribution of argument structure, quantification, and coordination to meaning. GE credit: ArtHum, Wrt | AH.—F. (F.) Ojeda

#### 150. Languages of the World (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Anthropology 4. Survey of the world's languages, their geographical distribution and classification, both genetic and typological. Illustrative descriptions of several major languages from different geographical areas; pidgins and creoles, lingua francas and other languages of widespread use. Not open for credit to students who have completed course 50. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC.—S. (S.) Hawkins

**151. Historical Linguistics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 103A. Description and methods of the historical study of language, including the comparative method and internal reconstruction; sound change, morphological change, syntactic change, semantic change. Offered irregularly. GE credit: ArtHum | AH.—Hawkins, Farrell

**152. Language Universals and Typology (4)**

Lecture—3 hours; term paper. Prerequisite: course 103B. Investigation into common features of all human languages and the classification of languages in terms of their structural features. Theories of universal grammar. Detailed discussion of non-Indo-European languages and comparison with English. Offered in alternate years. GE credit: ArtHum, Wrt | AH.—S. (S.) Farrell, Hawkins

**160. American Voices (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Anthropology 4 or upper division standing recommended. Explores the forms of American English; traditional notions of regional dialects and increasingly important social dialects, reflecting age, class, gender, race, ethnicity, and sexual orientation. The influence of language attitudes on perception of dialect speakers; dialect in media, education, and literature. GE credit: SocSci, Div, Wrt | SS, WE.—F, W. (F, W.)

**163. Language, Gender, and Society (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Anthropology 4. Investigation of real and putative (stereotyped) gender-linked differences in language structure and usage, with a consideration of some social and psychological consequences of such differences. Focus is on English, but other languages are also discussed. GE credit: SocSci, Div, Wrt | ACGH, DD, SS, WE.—W. (W.) Timm, Menard-Warwick

**165. Introduction to Applied Linguistics (4)**

Lecture—3 hours; discussion—1 hour. Applications of linguistic principles and the analysis of language-related issues in the world. Exploration of a range of language-related problems including issues related to language learning and teaching to issues concerning language and gender, race, class and the media. GE credit: SocSci | SS, WE.—W. (W.) Ramanathan

**166. The Spanish Language in the United States (4)**

Lecture—3 hours; term paper. Prerequisite: course 1 or Spanish 111N; and Spanish 23 or the equivalent. Linguistic features of the varieties of the Spanish language spoken throughout the United States; phonology, morphology, syntax, vocabulary. Focus on the relationship between United States Spanish and other world varieties of Spanish, within a historical framework. GE credit: SocSci, Div, Wrt | SS.—S. (S.) Ramanathan

**171. Introduction to Psycholinguistics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; courses 103A, 103B recommended. Introduction to psychological issues relating to the implementation of language and linguistic structure during speech production and comprehension and to the implications of research in psychology and related fields for linguistic theory. Offered in alternate years. GE credit: SS.—W. (W.) Corina

**173. Language Development (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor; courses 103A, 103B. Theory and research on children's acquisition of their native language, including the sound system, grammatical systems, and basic semantic categories. (Same course as Education 173.) Offered in alternate years. GE credit: SocSci | SS.—S. (S.) Uchikoshi

**175. Biological Basis of Language (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Overview of issues in the field of neurolinguistics and techniques used to explore representation of language in the human brain. GE credit: SciEng | SE.—F. (F.) Corina

**177. Computational Linguistics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Understanding the nature of language through computer modeling of linguistic abilities. Relationships between human cognition and computer representations of cognitive processing. Not open for credit to students who have completed course 7. GE credit: SciEng or SocSci | SE or SS.—W. (W.) Ojeda

**180. Second Language Learning and Teaching (4)**

Lecture/discussion—4 hours. Prerequisite: course 1 or equivalent. Psycholinguistic and sociolinguistic theories of second language learning. Connections between theoretical perspectives and pedagogical practices in formal and informal second language settings, with focus on tutoring. Impact of sociocontextual factors (e.g., gender, ethnicity). Fieldwork requirement. GE credit: SocSci, Div, Wrt | SS, WE.—F. (F.) Menard-Warwick

**182. Multilingualism (4)**

Lecture/discussion—4 hours. Limited enrollment. Issues in multilingualism from a global perspective: e.g., multilingual communities; multilingualism and identity (gender, ethnicity, nationality); language ideologies and educational and sociopolitical policies surrounding multilingualism; acquisition of multilingualism; discursive practices of multilinguals. GE credit: ArtHum or SocSci, Div, Wrt | SS, WC, WE.—S. (S.) Ramanathan, Timm

**192. Internship in Linguistics (1-12)**

Internship—3-36 hours; two written reports. Prerequisite: course 1 or the equivalent. Internship applying linguistic-related skills to a fieldwork project in areas such as media, law, or industry, in approved organizations or institutions. Maximum of 4 units applicable toward major. (P/NP grading only.)

**194H. Special Study for Honors Students (1-5)**

Independent study—1-5 hours. Prerequisite: open only to linguistics majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member approved by the Program Director, leading to a senior honors thesis. May be repeated for credit for up to 6 units. (P/NP grading only.)—F, W, S. (F, W, S.)

**197T. Tutoring in Linguistics (1-4)**

Discussion—1-4 hours. Prerequisite: upper division standing, consent of instructor, and consent of department chairperson. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

**198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S. (F, W, S.)

**199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.)

**Graduate****200A. Foundations of Linguistics I (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing. Survey of fundamental issues raised by pregenerative linguistics in the twentieth century, with emphasis on issues crucial to applications of linguistics. Not open for credit to students who have completed course 203A.—F. (F.)

**200B. Foundations of Linguistics II (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing. Survey of fundamental issues raised by orthodox generative linguistics, with emphasis on issues crucial to applications of linguistics. Not open for credit to students who have completed course 203B.—W. (W.)

**200C. Foundations of Linguistics III (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing. Survey of fundamental issues raised by contemporary linguistic theories lying outside the generative grammar orthodoxy, with emphasis on issues crucial to applications of linguistics.—S. (S.)

**205A. Topics in Linguistic Theory and Methods (4)**

Seminar—3 hours; term paper. Prerequisite: consent of instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs.—F, W. (F, W.)

**205B. Topics in Linguistic Theory and Methods (4)**

Seminar—3 hours; term paper. Prerequisite: consent of instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs.—F, W. (F, W.)

**205C. Topics in Linguistic Theory and Methods (4)**

Seminar—3 hours; term paper. Prerequisite: consent of instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs.—F, W. (F, W.)

**205D. Topics in Linguistic Theory and Methods (4)**

Seminar—3 hours; term paper. Prerequisite: consent of instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs.—F, W. (F, W.)

**211. Advanced Phonological Theory and Analysis (4)**

Lecture—3 hours; term paper. Prerequisite: course 111. Critical examination of current phonological theories. Offered in alternate years.—S. (S.) Barreda, Zellou

**212. Advanced Phonetics (4)**

Lecture—3 hours; term paper. Prerequisite: course 112. Advanced investigation of the physiological basis of speech articulation and acoustic phonetics. Offered in alternate years.—W. (W.) Barreda, Zellou

**231. Advanced Syntactic Theory and Analysis (4)**

Lecture—3 hours; term paper. Prerequisite: course 131. Critical survey of contemporary theories of syntax. Offered in alternate years.—S. (S.) Aranovich

**241. Advanced Semantic Theory and Analysis (4)**

Lecture—3 hours; term paper. Prerequisite: course 141 or consent of instructor. Advanced critical exploration of contemporary theories of linguistic semantics. Offered in alternate years.—W. (W.) Ojeda

**251. Principles of Historical Linguistics (4)**

Lecture—3 hours; term paper. Prerequisite: course 151. Advanced analysis of the theory and methods of historical linguistics. Offered in alternate years.—S. (S.)

**252. Romance Linguistics (4)**

Lecture—3 hours; term paper. Prerequisite: course 151. Examination of the development of the Romance languages from Proto-Romance to the modern era. Application and critical examination of methods of historical and comparative linguistics in particular areas of structural change in Romance. Offered in alternate years.—S. (S.)

**260. Variation in Speech Communities (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 281 or consent of instructor. Linguistic variability in time, space, and society. Theoretical issues related to social and linguistic constraints in variation; issues and methods in the quantitative analysis of variation. Speech community, quantitative analytic methods, and the scope of sociolinguistic competence.—W. (W.) Bayley

**263. Discourse Analysis: Text in Context (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing. Introduction to and application of leading theoretical approaches to the analysis of discourse. Approaches to the analysis of (spoken and written) text in context, tools for analyzing different types of texts (narration, conversation, etc.). Theme/rheme, given/new, anaphora, discourse markers, and other lexical/grammatical features.—F. (F.) Menard-Warwick

**264. Current Issues in Language and Gender (4)**

Seminar—3 hours; term paper; project. Prerequisite: graduate standing; prior coursework in Linguistics, Gender Studies, or Cultural Studies is desirable; no expectation of bilingual proficiency. Exploration of the construction and performance of gender through language in cross-cultural perspective and in a variety of contexts: informal conversations, narratives, workplaces, schools, households, the mass media. Special topics may include: language acquisition; multilingualism; ecofeminism; queer theory. May be repeated for credit one time when topic differs. Offered in alternate years—F. (F.) Menard-Warwick, Timm

**265. Language, Performance, and Power (4)**

Seminar—3 hours; term paper. Restricted to graduate standing or consent of instructor. Exploration of the intersection between linguistic and social theories in the language-state relation and the performance of identity. Ideological sources of language differentiation; nation-building and linguistic difference. Political economic, sociolinguistic, and ethnographic approaches to understanding linguistic inequality. (Same course as Anthropology 265.) Offered in alternate years.—F. (F.) Shibamoto-Smith

**275. Neurobiology of Language (4)**

Lecture/discussion—3 hours; term paper. Survey of historical and modern conceptions of the neurobiology of language. Aphasia, functional neuroimaging, functional neuroanatomy of human language.

Offered in alternate years.—F. (F.) Corina

**280. Theories of Second Language Acquisition (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Covers theoretical perspectives that direct or have directed research in second language acquisition; explores the relationship between linguistics and language teaching and deals with the individual variables that influence second language learning.—F. (F.) Ramanathan

**281. Research Methods in TESOL/SLD (4)**

Lecture—3 hours; term paper. Prerequisite: course 280. Research methods in second language research; evaluation of research designs and methods of analyses, formulation of research questions and hypotheses and design of study with thought to various kinds of data.—W. (W.) Bayley

**282. Individual and Social Aspects of Bilingualism (4)**

Lecture—3 hours; term paper. Broad overview of bi- and multilingualism, with focus on theoretical and descriptive research; topics covered range from language processing in bilinguals to code-switching to language as political issue in multilingual states.—S. (S.) Bayley, Menard-Warwick, Ramanathan

**283. Politics of Bi and Multilingual Literacies (4)**

Lecture/discussion—3 hours; term paper. Anthropological, psycho-social, political, and educational perspectives on bi and multilingualism. Power, colonialism, "native/non-native" speakers, and varieties and the unequal distribution of social goods. Analysis of how competing factors keep peoples disenfranchised.—W. (W.) Ramanathan

**289. Pedagogical Applications of Second Language Acquisition Theory (4)**

Seminar—3 hours; term paper. Prerequisite: course 280. Pedagogical implications of various theories of second language acquisition, facilitation of language acquisition in classroom settings, and techniques for conducting classroom-based research in language learning.—S. (S.)

**297T. English as a Second Language Teaching/Tutoring (1-4)**

Tutoring—1-4 hours. Prerequisite: course 300, 301, or 302 (may be taken concurrently). Teaching classes for ESL graduate students. Aiding the ESL undergraduate composition classes; tutoring foreign graduate student Teaching Assistants in pronunciation. Does not fulfill requirement toward the M.A. degree. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**298. Directed Group Study (1-5)**

Prerequisite: graduate standing. (S/U grading only.)—S. (S.)

**299. Research (1-12)**

(S/U grading only.)—F, W, S. (F, W, S.)

**Professional****300. Language Pedagogy (4)**

Lecture/discussion—4 hours. Prerequisite: graduate standing in Linguistics or consent of instructor; concurrent enrollment in course 297T recommended. Methods of teaching second languages to nonnative speakers, stressing particularly recent linguistic methodology and techniques, as related to teaching and tutoring in the UC Davis ESL program.—F. (F.) Menard-Warwick

**301. Teaching Academic Literacy (4)**

Seminar—3 hours; tutorial—14 hours; project; practice. Prerequisite: graduate standing; course 300 or consent of instructor. Methods of teaching advanced academic literacy in a second language, with a focus on ESL composition. Lesson development, teaching and tutoring in the UC Davis ESL program.—W. (W.) Ramanathan

**302. Recent Research and Special Projects in TESOL (4)**

Lecture—4 hours. Prerequisite: courses 300 and 301. Review of recent research in second language acquisition and the teaching of English to speakers of other languages. Continued teaching and tutoring in the UC Davis ESL clinic. Each student also designs and reports on a classroom research project.

**305. Second Language Literacy and Technology (4)**

Lecture/discussion—1.5 hours; web electronic discussion—1.5 hours. Prerequisite: course 2, or equivalent coursework/experience in second language pedagogy; consent of instructor; graduate students only. Limited enrollment. Exploration of literacy theory and critical pedagogy in relation to new instructional and communication technologies. Practicum experience in teaching second language literacy; reflection on connections between theory and practice.—S. (S.) Menard-Warwick

**310. Language Pedagogy for Teacher Educators (4)**

Seminar—3 hours; tutorial; project; fieldwork. Prerequisite: admission to Ph.D. program in Linguistics or Foreign Languages, or permission of instructor; significant language teaching experience. Current issues in second language pedagogy, with a focus on communicative methodology, participatory curriculum design, academic literacy, and the social contexts of teaching. Emphasis on reflective teaching and action research. May be repeated up to 12 units for credit.—F, W, S. (F, W, S.) Menard-Warwick, Ramanathan

**391. Oral English for ESL Students (3)**

Lecture—2 hours; laboratory—2 hours. Prerequisite: open only to non-native speakers of English with priority enrollment to international student teaching assistants; completion of any required ESL courses or consent of instructor. Course gives non-native English-speaking students, particularly international student teaching assistants, intensive work in oral English to increase fluency, accuracy, and use of appropriate discourse strategies in academic settings (e.g., seminar, discussion, laboratory). Course may be repeated for credit with consent of coordinator. (S/U grading only.)—W, S. (W, S.)

**396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## Linguistics (A Graduate Group)

Robert J. Bayley, Chairperson of the Group

**Group Office.** 462 Kerr Hall  
530-752 3464

**Faculty**

Raúl Aranovich, Ph.D., Associate Professor  
(Linguistics)

Carlee Arnett, Ph.D., Associate Professor (German)  
Santiago Barreda, Ph.D., Assistant Professor  
(Linguistics)

Robert J. Bayley, Ph.D., Professor (Linguistics)  
Robert Blake, Ph.D., Professor (Spanish)  
Travis G. Bradley, Ph.D., Associate Professor  
(Spanish)

Chengzhi Chu, Ph.D., Associate Professor  
(East Asian Languages and Cultures)  
M. Cecilia Colombi, Ph.D., Professor (Spanish)  
David Corina, Ph.D., Professor (Linguistics)

Patrick Farrell, Ph.D., Professor (Linguistics)  
Fernanda Ferreira, Ph.D., Professor (Psychology)  
Dana Ferris, Ph.D., Professor  
(University Writing Program)

John A. Hawkins, Ph.D., Distinguished Professor  
(Linguistics)

Debra Long, Ph.D., Professor (Psychology)  
Robert May, Ph.D., Distinguished Professor  
(Philosophy)

Julia Menard-Warwick, Ph.D. Professor (Linguistics)  
Almerindo E. Ojeda, Ph.D., Professor (Linguistics)  
Vaidehi Ramanathan, Ph.D., Professor (Linguistics)  
Eric Russell Webb, Ph.D., Assistant Professor  
(French)

Claudia Sánchez-Gutiérrez, Ph.D., Assistant  
Professor (Spanish)

Adam Sennet, Ph.D., Associate Professor  
(Philosophy)

Tamara Swaab, Ph.D., Associate Professor  
(Psychology)

Matthew Traxler, Ph.D., Professor (Psychology)  
Yuuko Uchikoshi, Ed.D. Assistant Professor  
(Education)

Karen A. Watson-Gegeo, Ph.D., Professor  
(Education)

Georgia Zellou, Ph.D., Assistant Professor  
(Linguistics)

**Emeriti Faculty**

Wilbur A. Benware, Ph.D., Professor Emeritus

Ellen Lange, M.A., Senior Lecturer Emerita

David L. Omsted, Ph.D., Professor Emeritus

Mary Schleppegrell, Ph.D., Professor Emerita

Gwendolyn Schwabe, M.A., Senior Lecturer Emerita

Lenora A. Timm, Ph.D., Professor Emerita

Maximo Torreblanca, Ph.D., Professor Emeritus

**Graduate Study.** The Graduate Group in Linguistics offers a program of study leading to the M.A. and the Ph.D. degree. The M.A. program follows PLAN II. 36-38 units of coursework are required, at least 18 of which must be graduate level courses in the major field. A comprehensive final examination in the major subject is required of each candidate. No thesis is required.

The Ph.D. degree offers advanced training and research in linguistic theories and methods. Second language acquisition and development is a particular emphasis of the program. Detailed information on both the M.A. and the Ph.D. degrees can be obtained from the graduate advisers, from the chair of the Graduate Group or the departmental chairs.

**Graduate Advisers.** Raúl Aranovich (Linguistics),  
Julia Menard-Warwick (Linguistics)

# Literature in Translation

The following courses are open to students throughout the campus. The readings can be in English. See departmental listing for the course description.

## Chinese

- 10. Chinese American Literature (in English)
- 11. Great Books of China (in English)
- 50. Introduction to the Literature of China and Japan (in English)
- 100A. Daoist Traditions
- 101. Chinese Film
- 102. Chinese American Film
- 103. Modern Chinese Drama
- 104. Twentieth-Century Chinese Fiction (in English)
- 105. Western Influences on Twentieth-Century Chinese Literature (in English)
- 106. Chinese Poetry (in English)
- 107. Traditional Chinese Fiction (in English)
- 108. Poetry of China and Japan (in English)
- 109A-I. Topics in Chinese Literature (in English)
- 110. Great Writers of China: Texts and Context (in English)

## Classics

- 10. Greek, Roman, and Near Eastern Mythology
- 10Y. Greek, Roman, and Near Eastern Mythology
- 140. Homer and Ancient Epic
- 141. Greek and Roman Comedy
- 142. Greek and Roman Novel
- 143. Greek Tragedy

## Comparative Literature

- 1. Great Books of Western Culture: The Ancient World
- 2. Great Books of Western Culture: From the Middle Ages to the Enlightenment
- 3. Great Books of Western Culture: The Modern Crisis
- 4. Major Books of the Contemporary World
- 5. Fairy Tales, Fables and Parables
- 6. Myths and Legends
- 7. Literature of Fantasy and the Supernatural
- 8. Utopias and their Transformations
- 9. The Short Story and Novella
- 10A-N. Master Authors of World Literature
- 12. Introduction to Women Writers
- 13. Dramatic Literature
- 14. Introduction to Poetry
- 20. Humans and the Natural World
- 25. Ethnic Minority Writers in World Literature
- 53A. Literature of China and Japan
- 53B. Literature of India and Southeast Asia
- 53C. Literatures of the Islamic World
- 100. World Cinema
- 120. Writing Nature: 1750 to the Present
- 135. Women Writers
- 138. Gender and Interpretation
- 139. Shakespeare and the Classical World
- 140. Thematic and Structural Study of Literature
- 141. Introduction to Critical Theoretical Approaches to Literature and Culture
- 142. Critical Reading and Analysis
- 144. The Grotesque
- 145. Representations of the City
- 146. Myth in Literature
- 147. Modern Jewish Writers
- 151. Colonial and Postcolonial Experience in Literature
- 152. Literature of the Americas
- 153. The Forms of Asian Literature
- 154. African Literature
- 155. Classical Literature of the Islamic World

- 157. War and Peace in Literature
- 158. The Detective Story as Literature
- 159. Women in Literature
- 160A. The Modern Novel
- 160B. The Modern Drama
- 161A. Tragedy
- 161B. Comedy
- 163. Biography and Autobiography
- 164A. The Middle Ages
- 164B. The Renaissance
- 164C. Baroque and Neoclassicism
- 164D. The Enlightenment
- 165. Caribbean Literature
- 166. Literature of the Modern Middle East
- 166A. The Epic
- 166B. The Novel
- 167. Comparative Study of Major Authors
- 168A. Romanticism
- 168B. Realism and Naturalism
- 169. The Avant-Garde
- 170. The Contemporary Novel
- 180. Selected Topics in Comparative Literature
- 194H. Special Study for Honors Students
- 195. Seminar in Comparative Literature

## Dramatic Art

- 20. Introduction to Dramatic Art
- 154. Asian Theatre and Drama: Contexts and Forms
- 156AN. Performance Analysis
- 156BN. Theatre in History and Place: Local, National and Global Conditions for Production
- 156CN. Modern Aesthetic Movements in Performance
- 159. Contemporary Experimental Theatre and Drama

## French

- 50. French Film
- 51. Major Works of French
- 52. France and the French-Speaking World

## German

- 48. Myth and Saga in the Germanic Cultures
- 49. Freshman Colloquium
- 112. Topics in German Literature
- 113. Goethe's Faust
- 115. German Literature since 1945
- 118A. Fin-de-siècle Vienna (The Swan Song of the Habsburg Empire)
- 118B. Weimar Culture: Defeat, the Roaring Twenties, the Rise of Nazism
- 118C. Germany under the Third Reich
- 119. From German Fiction to German Film
- 141. The Holocaust and its Literary Representation
- 142. New German Cinema: From Oberhausen to the Present

## Italian

- 50. Studies in Italian Cinema
- 107. Survey of Italian Culture and Institutions
- 108. Contemporary Issues in Italian Culture and Society
- 139B. Boccaccio, Petrarch and the Renaissance
- 140. Italian Literature in English Translation: Dante, Divine Comedy
- 141. Culture, Gender and the Italian Renaissance
- 142. Masterpieces of Modern Italian Narrative
- 150. Studies in Italian Cinema

## Japanese

- 10. Masterworks of Japanese Literature (in English)
- 15. Introduction to Traditional Japanese Culture
- 50. Introduction to the Literature of China and Japan

- 101. Japanese Literature in Translation: The Early Period
- 102. Japanese Literature in Translation: The Middle Period
- 103. Japanese Literature in Translation: The Modern Period
- 104. Modern Japanese Literature: War and Revolution
- 105. Modern Japanese Literature: Hero and Anti-Hero
- 106. Japanese Culture through Films
- 107. Modern Japanese Autobiographies (in English)
- 108. Poetry of China and Japan
- 109. Japanese Popular Culture
- 152. Traditional Japanese Drama
- 156. Japanese Literature on Film

## Native American Studies

- 181A. Native American Literature (the novel and fiction)
- 181B. Native American Literature (non-fiction works by Native authors)
- 181C. Native American Literature (traditional and contemporary poetry)
- 184. Contemporary Indigenous Literature of Mexico
- 188. Special Topics in Native American Literary Studies

## Russian

- 45. Russian Fantasy
- 121. Nineteenth-Century Russian Prose
- 123. Twentieth-Century Russian Prose
- 126. The Russian Theater
- 130. Contemporary Soviet Culture
- 140. Dostoevsky
- 141. Tolstoy

## Spanish

- 149. Latin-American Literature in Translation

## Luso-Brazilian Studies

(College of Letters and Science)

The Department of Spanish and Portuguese sponsors the minor in Luso-Brazilian Studies, which offers students the opportunity to engage with the Portuguese-speaking world as a global space, as well as gain in-depth knowledge of Brazilian literature, culture and society. The minor is structured to facilitate engagement with Latin American, peninsular, and transatlantic topics, while ensuring that students master the essential skills of linguistic competence, and literary and cultural knowledge.

## Minor Program Requirements:

UNITS

### Luso-Brazilian Studies ..... 23-24

Portuguese 100, 161 ..... 8

Select one course in each of the following categories:

Spanish 111N, 115, or 116 ..... 3-4

Portuguese 162 or 163 ..... 4

Select one elective course in each of the following categories:

Portuguese 159, 162, or 163 ..... 4

History 159, 163A, or 163B ..... 4

Note: Consult a departmental adviser if any of these courses are to be taken abroad.

Note: Additional courses may count toward the minor with prior approval by a departmental adviser.

**Minor Advisers.** L. Bernucci, R. Newcomb

## Education Abroad Program Options

We highly recommend that students participate in study abroad in Salvador, Brazil; see <http://studyabroad.ucdavis.edu>. Courses taken abroad may count toward the Luso-Brazilian Studies minor.

# Management, Graduate School of

Ann Huff Stevens, Ph.D., Interim Dean  
 Kimberly D. Elsbach, Ph.D., Associate Dean  
 Brad M. Barber, Ph.D., Associate Dean  
 James T. Kelly, M.B.A., Assistant Dean  
 James Stevens, M.B.A., Senior Assistant Dean  
**School Office.** Gallagher Hall  
 530-752-7658

## Faculty

Shannon W. Anderson, Ph.D., Professor  
 Ashwin Aravindakshan, Ph.D., Associate Professor  
 Brad M. Barber, Ph.D., Professor  
 Hemant K. Bhargava, Ph.D., Professor  
 David S. Bunch, Ph.D., Professor  
 Joseph Chen, Ph.D., Associate Professor  
 Rachel Chen, Ph.D., Associate Professor  
 Gina Dokko, Ph.D., Associate Professor  
 Roger Edelen, Ph.D., Associate Professor  
 Kimberly D. Elsbach, Ph.D., Professor  
 Paul A. Griffin, Ph.D., Professor  
 Andrew Hargadon, Ph.D., Professor  
 Greta Hsu, Ph.D., Professor  
 Robert Marquez, Ph.D., Professor  
 Prasad Naik, Ph.D., Professor  
 Michael Palazzolo, Ph.D., Assistant Professor  
 Donald A. Palmer, Ph.D., Professor  
 Olivier Rubel Ph.D., Associate Professor  
 Anna Scherbin, Ph.D., Associate Professor  
 Hollis Skaife, Ph.D., Professor  
 Victor Stango, Ph.D., Associate Professor  
 Alan Taylor, Ph.D., Professor  
 Chih-Ling Tsai, Ph.D., Professor  
 Paul A. Wong, Ph.D., Assistant Professor  
 David L. Woodruff, Ph.D., Professor  
 Catherine Yang, Ph.D., Associate Professor  
 Ayako Yasuda, Ph.D., Associate Professor  
 Michelle Yetman, Ph.D., Professor  
 Robert Yetman, Ph.D., Professor

## Emeriti Faculty

Nicole W. Biggart, Ph.D., Professor Emerita  
 Richard P. Castanias, Ph.D., Professor Emeritus  
 Peter K. Clark, Ph.D., Professor Emeritus  
 Richard C. Dorf, Ph.D., Professor Emeritus  
 Eitan Gerstner, Ph.D., Professor  
 Michael R. Hagerty, Ph.D., Professor Emeritus  
 Alexander F. McCalla, Ph.D., Professor Emeritus  
 Michael Maher, Ph.D., Professor Emerita  
 Robert H. Smiley, Ph.D., Professor Emeritus  
 Jerome J. Suran, B.S., Ph.D. (hon.), Senior Lecturer Emeritus

The Graduate School of Management offers a minor in Technology Management to undergraduate students. This minor complements students' undergraduate studies with courses in the ways in which engineering and science-based industrial enterprises manage and use knowledge from science, engineering and technology. The minor also provides students with business and management skills that should enable them to use their engineering and science education more effectively in a technology environment.

## Minor Prerequisites:

Students must take these courses for a letter grade of C- or better.

### UNITS

Management 11A .....	4
Mathematics 16A-16B, 17A-17B or 21A-21B .....	6-8
Statistics any 100 level course or 13 above .....	4

## Minor Program Requirements:

### UNITS

<b>Technology Management.....</b>	<b>20</b>
Choose five courses from: Management 120, 140, 150, 160, 170, 180 .....	20

## Courses in Management (MGT/MGB/MGP)

### Lower Division

#### 11A. Elementary Accounting (4)

Lecture—3 hours; discussion—1 hour. Basic concepts of accounting; interpreting and using financial statements; understanding accounting principles. GE credit: SocSci | SS.—F, W. (F, W.)

#### 11B. Elementary Accounting (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 11A. Theory of product costing; Analyzing the role and impact of accounting information on decision making; planning and performance evaluation. GE credit: SocSci | SS.—S. (S.)

#### 12Y. Navigating Life's Financial Decisions (3)

Lecture—2 hours; web virtual lecture—1 hour. Restricted to students enrolled in the MBA program. Survey of major life financial decisions (e.g., career choice, consumption v. saving, investments, mortgages, insurance) and how decision-making biases (e.g., overconfidence, present bias, limited attention) can lead to suboptimal choice. The course draws on research from economics, psychology, and sociology. Offered irregularly. GE credit: SS, QL.—W. (W.)

#### 98. Directed Group Study (1-5)

Seminar—3-15 hours. Prerequisite: consent of instructor. Open to all undergraduates, but is primarily intended for lower division students. (P/NP grading only.)—F, W, S. (F, W, S.)

### Upper Division

#### 100. Introduction to Financial Accounting (3)

Lecture—3 hours. Prerequisite: course 11A. Course is open to all upper division undergraduate and graduate students, except those in the Graduate School of Management. Introduction to the concepts, methods, and uses of accounting and financial reporting.—F. (F.)

#### 120. Managing and Using Information Technology (4)

Lecture—3 hours; discussion—1 hour. Develop an analytical framework to manage and monitor business systems concerned with operational, human, and organizational interactions. Introduction to computer hardware, systems software, and information systems. Management of information technology and the impact of information systems on modern management. GE credit: SocSci | SS.—Aram

#### 140. Marketing for the Technology-Based Enterprise (4)

Lecture—3 hours; discussion—1 hour. Quantitative analysis of needs in a product (technology-based) economy, with emphasis on how scientists, engineers, and business people interact to develop and market products and services.—W. (W.) Findlay

#### 150. Technology Management (4)

Lecture—3 hours; discussion—1 hour. Management of firms in high technology industries such as software development and biotechnology research. Motivating and managing workers, organizing for innovation, and making decisions. GE credit: SocSci | SS.—W, S, Su. (W, S, Su.) Olson

#### 160. Financing New Business Ventures (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 11A; Mathematics 16B, 17B, or 21B; Statistics 13. Concepts/methods used to structure and finance new business ventures. Topics include evaluating the net social (financial) benefit of new investment projects; raising venture capital; the role of the venture capitalist; and the choice of organizational structure in new ventures. GE credit: SocSci | SS.—F. (F.) Briscoe

#### 170. Managing Costs and Quality (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 11A. Designing cost systems in high technology organizations and managing operations to maximize quality and minimize costs. Topics include activity based costing and management, managing

quality and time to create value, ethical issues in cost assignment, and differential costing for decision. GE credit: SocSci | SS.—S. (S.)

#### 180. Supply Chain Planning and Management (4)

Lecture—3 hours; discussion—1 hour. Course develops key concepts and relationships between supply chain design and business models and strategies. Much of the focus is on quantitative techniques for analysis and management of the production and delivery of goods and services by an organization. GE credit: SocSci | SS.—F. (F.) Hopman

### Graduate—Core Courses

#### 200A. Financial Accounting (3)

Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management. Introduction to the concepts and objectives underlying the preparation of financial statements. Topics include understanding the accounting cycle, measurement and valuation problems associated with financial statement components, consideration of the usefulness of financial statements in the analysis of a corporation's operations.—F. (F.) M. Yetman

#### 200B. Managerial Accounting (3)

Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management. Information managers should know to be effective, including: product costing, motivating people, and differential analysis for decision making. Includes team projects and written and oral presentations.—W, Su. (W, Su.)

#### 201A. The Individual and Group Dynamics (3)

Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management. Examines basic psychological and social psychological processes shaping human behavior and applies knowledge of these processes to the following organizational problems: motivation, job design, commitment, socialization, culture, individual and group decision making, and team building.—F. (F.) Elsbach

#### 201B. Organizational Strategy and Structure (3)

Lecture/discussion—3 hours. Prerequisite: completion of first year courses in Graduate School of Management or the equivalent. Open to MBA students only. Strategic management of organizations, including analysis of industries, firm resources and capabilities and corporate strategy. Strategy formulation, implementation and strategic decision-making. Firm and industry life cycles and change. Analysis of organizational design and structure including differentiation and integration.—F. (F.) Dokko

#### 202A. Markets and the Firm (3)

Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management. Examines the interaction of consumers, firms and government, and the effect this interaction has on the use of resources and firm profitability. Fundamental economic concepts such as marginal analysis, opportunity cost, pricing, and externalities are introduced and applied.—W. (W.) Stango

#### 202B. Business, Government, and the International Economy (3)

Lecture—3 hours. Prerequisite: course 202A. Examines the influence of government and international factors on business. Topics include distribution of income, business cycles, inflation and interest rates, the federal debt, monetary policy and international trade and finance.—W. (W.) Taylor

#### 203A. Data Analysis for Managers (3)

Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management MBA program or consent of instructor. Introduction to statistics and data analysis for managerial decision making. Descriptive statistics, principles of data collection, sampling, quality control, statistical inference. Application of data analytic methods to problems in marketing, finance, accounting, production, operations, and public policy.—W. (W.)

**203B. Forecasting and Managerial Research Methods (3)**

Lecture—3 hours. Prerequisite: course 203A. Practical statistical methods for managerial decision making covers regression analysis, time series analysis and forecasting, design and analysis of experiments in managerial research and contingency table analysis. Application of these methods to marketing, finance, accounting, production, operations, and public policy.—W. (W.) Tsai

**204. Marketing Management (3)**

Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management. Analysis of market opportunities, elements of market research, development of marketing strategies, market planning and implementations, and control systems. Consumer and industrial markets, market segmentation, pricing strategies, distribution channels, promotion, and sales.—S. (S.) Naik

**205. Financial Theory and Policy (3)**

Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management. Corporate financial policy and investment management. Covers capital budgeting, optimal financial structure, cost-of-capital determination, risk measurement. Develops basic valuation principles for investments with long-lived and risky cash-flows, and extends these to derivative securities, asset portfolios, investment management and hedging.—S. (S.) Barber

**206. Decision Making and Management Science (3)**

Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management MBA program or consent of instructor. Develops decision-making and problem-solving skills in conjunction with a quantitative model-building approach. Emphasizes how structured modeling techniques, probability forecasts, simulations, and computer optimization models are used in the overall process of making decisions in an uncertain environment.—Su. (Su.) R. Chen

**207. Management Information Systems (3)**

Lecture—3 hours. Prerequisite: graduate student or consent of instructor. Introduction to computer programming and data handling skills. Use of computer in organizations, emphasis on managerial aspects of computing. Standard and nonstandard uses of data files, centralization versus decentralization of computing, office automation, computer security.—F. (F.) Aram

**Electives**

Students must complete the Management core course requirement before enrolling in any of the following courses, or petition with consent of the instructor.

**215. Business Law (3)**

Lecture—3 hours. Prerequisite: completion of Administration core requirements or petition with consent of instructor. Introduction to law and legal process in the United States. Sources of law. Structure and operation of courts, federal-state relationships, fundamentals of administrative law, fundamentals of business law.—W. Su. (W. Su.)

**216. Managing Professionals, Budgets, Controls and Ethics (3)**

Lecture—3 hours. Prerequisite: graduate standing. Performance measures, budgetary controls and ethical pressures which occur at middle management levels in service-type operations. Addresses such organizations as engineering, medical groups, law offices, management consultants.—F. (F.) Suran

**217. The Business of Politics (3)**

Lecture—3 hours. Class size limited to 30 students. Covers the role of business and business leaders as policy and political actors at the federal, state, and local level, including government relations programs, regulation of business by government, political campaigns, and policy as a business advantage.—W. Su. (W. Su.) M. Smith

**220. Management of Social Networks (3)**

Lecture/discussion—3 hours. Prerequisite: course 201A. Open to MBA students only. Principles and applications of social network theory; coordinating divergent interests to create value for individuals and organizations. Emphasis on conceptual models, web-based diagnostic tools, and practical applications.—F. (F.)

**223. Power and Influence in Management (3)**

Seminar—3 hours. Prerequisite: consent of instructor. Investigation of the bases of power in organizations and the tactics used to translate power into influence. Topics include the control of resources (including information), social psychological processes (including commitment), the construction of meaning, and ethics.—F. (F.) Palmer

**224. Managing Human Resources (3)**

Lecture/discussion—3 hours. Open to MBA students only. Restricted to MBA students only. Explore choices firms make in managing workers-decisions as to wages, benefits, working conditions, and other management policies and practices. Analyze employment systems' fit with firms' environments and strategies, and the consequences of choices managers make regarding policies and practices. Not open to students who have taken MGT 224 or MGP 224.—W. Su. (W. Su.) Hsu

**234. Pricing (3)**

Lecture/discussion—3 hours. Prerequisite: completion of first year core courses at the Graduate School of Management or equivalent, including courses 202A & 203B. Restricted to students in the MBA Program. Combines lectures, cases and homework to teach students tools and skills necessary to analyze pricing situations, make pricing decisions, and implement them, in a systematic manner.—S. (S.)

**239. Digital Marketing (3)**

Lecture/discussion—3 hours. Prerequisite: course 204. Course equips students for a career in digital marketing and social media. Topics include online advertising, search engine optimization, interactive mktg, online privacy issues, e-commerce, social influence, social network theory, measurement of social influence, integrating social and traditional media.—S. (S.) Peters

**240. Management Policy and Strategy (3)**

Lecture—3 hours. Prerequisite: first-year core courses of M.B.A. program. Examines the scope of missions, objectives strategies, policies, structures, measurements and incentives which bear on the management of an organization. Real client organizations, in the private and public sectors, are assigned to student teams as the subjects of study.—F. (F.)

**241. New Product Development (3)**

Lecture/discussion—3 hours. Prerequisite: course 249 or consent of instructor. Open to graduate students in the Graduate School of Management. State-of-the-art concepts and methods to enhance the effectiveness of new product development activities. Focuses on the understanding of managerial issues and acquiring the ability to solve problems.—W. Su. (W. Su.) Aravindakshan

**242. Marketing Communications (3)**

Lecture—3 hours. Issues in designing a marketing communications strategy. Topics include mass and direct communications, institutional aspects of advertising, consumer behavior, evaluating ad effectiveness, determining ad budget, creative strategy, and use and abuse of promotions.—S. (S.)

**243. Customer Relationship Management (3)**

Lecture/discussion—3 hours. Prerequisite: completion of first-year core courses at the Graduate School of Management or the equivalent. Restricted to MBA students only. Customer Relationship Management (CRM) is a management approach under which marketing activities are organized and measured around customers (rather than around brands.) This approach is appealing because customers, not brands, are those who make buying decisions.—F. (F.) Aravindakshan

**244. New and Small Business Ventures (3)**

Lecture—3 hours. Student teams develop complete business plans for their own start-up ventures. Process includes: elevator pitch, business strategy, comprehensive bottoms-up financial projections, capital requirements, product differentiation, competitive, alliance, and go-to-market strategy development, investor presentation, and comprehensive written business plan.—F. W. (F. W.) Lowe

**245. Business Writing (3)**

Lecture/discussion—3 hours. Prerequisite: completion of first-year core courses at the Graduate School of Management or the equivalent. Restricted to MBA students only. Techniques for sharpening writing skills are introduced, along with grammatical structure, word choice, and punctuation. Learn to develop styles that are pitch-perfect for given situations and to think strategically about each communication challenge in a management setting.—W. (W.)

**246. Negotiation and Team Building (3)**

Lecture/discussion—3 hours. Prerequisite: courses 202, 205. Basic theory of negotiation; applies theory to process of building teams to achieve business purposes. Covers integrative and distributive strategies of claiming value, how to recognize bargaining tricks, uncovering hidden agendas, brainstorming to extend Pareto frontier.—W. (W.) Olson

**247. Customer Service as a Marketing Tool (3)**

Lecture—3 hours. Understanding the distinct features of services, how to create value through service, methods of building strong relationships with customers, methods of measuring and building customer satisfaction, and measuring the financial impact of service improvement.—F. (F.)

**248. Marketing Strategies (3)**

Lecture—3 hours. Examines process by which organizations develop strategic marketing plans. Includes definition of activities and products, marketing audits, appraising market opportunities, design of new activities and products, and organizing marketing planning function. Applications to problems in private and public sector marketing.—F. (F.) Rubel

**249. Marketing Research (3)**

Lecture—3 hours. Course addresses the managerial issues and problems of systematically gathering and analyzing information for making private and public marketing decisions. Covers the cost and value of information, research design, information collection, measuring instruments, data analysis, and marketing research applications.—W. (W.) Bunch

**250. Technology, Competition and Strategy (3)**

Lecture—3 hours. Prerequisite: completion of first-year core courses at the Graduate School of Management or the equivalent. Restricted to students in the MBA program. Why is software typically so defective? Why do many firms in the IT industry give away their best products free? This course helps you analyze questions like these by modeling competition and strategy in the network, technology and information industries.—W. (W.) Bhargava

**251. Management of Innovation (3)**

Lecture—3 hours. Managing innovative enterprise in changing and uncertain environments. Covers technology forecasting and assessment, program selection and control, financial management, regulation, and ethics.—F. (F.) Hargadon

**252. Managing for Operational Excellence (3)**

Lecture—3 hours. Open to students in the Graduate School of Management. Explores the management of operations as applied to manufacturing as well as services provided both inside and outside the organization. Develop an understanding of how uncertainty affects planning and delivery by looking at fundamental models of operations.—S. (S.) Woodruff

**253. Corporate Social Responsibility (3)**

Lecture—3 hours. Goal in this course will be to develop a thought process and approach to corporate social responsibility that students will be able to

build on during their post-school leadership roles, whether as corporate executives, entrepreneurs, or NGO leaders. —S. (S.) Ansbach

### **255. Entrepreneurship and Venture Investment Clinic (3)**

Lecture—3 hours. Class size limited to 30 students. Provides the necessary analytical and design tools to create business ideas and refine business models based on emerging technologies. Students learn to work closely in small teams to synthesize technical, strategic, and marketing needs into designs for new ventures. —S. (S.) Vaidya

### **258. Mergers and Acquisitions (3)**

Lecture—3 hours. Course focuses on the market for corporate acquisitions and restructuring activity. Topics include: sources of value creation; takeovers; anti-takeover provisions; bidding strategies; use of leverage in buyouts; regulatory risk and hurdles; and, valuation approaches for highly leveraged transactions. —F. (F.) Marquez

### **259. Banking and the Financial System (3)**

Lecture—3 hours. Prerequisite: course 205 or Management 205 or Management Working Professional 205; consent of instructor. Analyzes the role of financial markets and institutions in allocating capital. Focuses on: bank lending; debt securities; financial market innovations; regulation; functions of commercial banks and other financial intermediaries. Utilizes case studies. —S. (S.) Marquez

### **260. Corporate Finance (3)**

Lecture—3 hours. Focuses on planning, acquiring, and managing a company's financial resources. Includes discussion of financial aspects of mergers and other forms of reorganization; analysis of investment, financial, and dividend policy; and theories of optimal capital structure. —S. (S.) Scherina

### **261. Investment Analysis (3)**

Lecture—3 hours. Examines asset pricing theories and relevant evidence, including the investment performance of stocks and bonds. Topics include the efficiency of markets, domestic and international portfolio diversification, factors influencing the value of stocks and other investments, and portfolio management and performance. —F. (F.) J. Chen

### **262. Money and Security Markets (3)**

Lecture—3 hours. Examines how money and securities markets are organized; how public agencies, businesses, others obtain and invest funds in those markets. Relationship between interest rates, monetary policy, government's role in improving capital markets, approaches to assessing changes in regulation of specific markets. —F. (F.)

### **263. Derivative Securities (3)**

Lecture/discussion—3 hours. Open to students enrolled in the MBA program. Behavior of options, futures, and other derivative securities markets and how public agencies, business and others use those markets. Trading strategies involving options, swaps, and financial futures contracts. Pricing of derivative securities, primarily by arbitrage methods. —F. (F.) Edelen

### **264. Business Taxation (3)**

Lecture—3 hours. Analysis of the impact of business taxation on investment, production, and finance decisions. Discussion of the relationship between business organization and tax liability. Course is not intended for tax specialists. —F. (F.)

### **265. Venture Capital and the Finance of Innovation (3)**

Lecture/discussion—3 hours. Prerequisite: completion of first-year core courses at the Graduate School of Management or the equivalent. Restricted to students in the MBA program. Examines venture capital finance and the related practice of R&D finance. Goal is to apply finance tools and framework to the world of venture capital and financing of projects in high-growth industries. —W. (W.) Yasuda

### **266. International Finance (3)**

Lecture—3 hours. Prerequisite: course 207 or the equivalent. Studies fixed and floating exchange-rate systems. Topics include determinants of a nation's balance of international payments; macroeconomic

interdependence of nations under various exchange-rate regimes and its implications for domestic stabilization policies; and the international coordination of monetary and stabilization policies. —S. (Su.)

### **267. Teams and Technology (3)**

Lecture/discussion—3 hours. Prerequisite: consent of instructor. Restricted to working professional MBA students. Theory and practice of managing teams with primary goals of: providing conceptual guidelines for analyzing and diagnosing group dynamics and determining strategic options as a manager; imparting interpersonal skills for implementing effective strategies; understanding how technological change affects team processes. —S. (S.) Olson

### **268. Articulation and Critical Thinking (3)**

Laboratory/discussion—3 hours. With commitment to this course, students will become competent public speakers, write well at a level expected in business, think efficiently and critically about business challenges and have a useful personal code of ethics to shape their actions and decisions. No student may repeat course for credit. —F. (F.) D. Kennedy

### **269. Business Intelligence Technologies-Data Mining (3)**

Lecture/discussion—3 hours. Prerequisite: consent of instructor. Restricted to students in the MBA program. Descriptive and Predictive Data mining methods covering association rules, clustering, classification, text mining, etc. Big data Technologies. Business applications. Hands-on data mining skills. Business intelligence for managerial decision making. —S. (S.) Yang

### **270. Corporate Financial Reporting (3)**

Lecture—3 hours. Analyzes and evaluates contemporary issues in financial reporting and develops implications of those issues for business decision makers, investment managers, and accounting policymakers. —F. Su. (F. Su.) Wong

### **271. Strategic Cost Management (3)**

Laboratory/discussion—3 hours. Restricted to students in the MBA program. Theoretical frameworks and associated techniques for using organizational design and cost management to achieve a sustainable, profitable cost structure. Topics include: target costing, process design for low cost, total cost of ownership, cost of customers, implementing structural change, and incentives. —W. (W.) Anderson

### **272. Evaluation of Financial Information (3)**

Lecture—3 hours. Studies how investors, creditors, others use accounting and other information in making rational investment, lending decisions. Emphasis is placed on the analysis of financial information in a variety of contexts. Where applicable, recent research in finance and economics is discussed. —W. (W.) Skaife

### **273. Accounting and Reporting for Government Nonprofit Entities (3)**

Lecture—3 hours. Concepts, methods, and uses of accounting and financial reporting by governmental and nonprofit entities. Introduction to budgeting and performance evaluation, and accounting for entities such as hospitals, universities, and welfare agencies. —S. (S.)

### **274. Corporate Governance (3)**

Lecture—3 hours. Prerequisite: restricted to full-time MBA students or consent of instructor. Discusses how corporations can better operate in the interests of shareholders and public. Directly relevant to managers, consultants in compensation and incentives, staff working on mergers and acquisitions, corporate regulators, shareholder rights activists, and board members. —S. (S.)

### **276. Real Estate, Finance and Development (3)**

Lecture—3 hours. Focus on single family, attached, detached, multi-family, and light commercial development. Students will study factors which make up successful real estate developments. Course will consider financial aspects involved in land acquisition, land development, construction, and project lending. —Su. (Su.)

### **281. Systems Analysis and Design (3)**

Lecture—3 hours. Design and specification of computer-based information systems. Applications systems development life cycle, use requirements and feasibility assessment, logical and physical design, program development and testing, conversion and implementation. —W. (W.)

### **282. Supply Chain Management (3)**

Lecture/discussion—3 hours. Prerequisite: completion of first year core courses at the Graduate School of Management or the equivalent; knowledge of Microsoft Excel. Restricted to students in the MBA program. Matching supply with demand is a primary challenge for a firm: excess supply is too costly, inadequate supply irritates customers. Matching supply to demand is easiest when a firm has a flexible supply process, but flexibility is generally expensive. —S. (S.) R. Chen

### **284. Applied Linear Models for Management (3)**

Lecture—3 hours. Covers regression, analysis of variance, and multivariate analysis. Topics will focus on applications to management and policy problems. —W. (W.)

### **285. Time Series Analysis and Forecasting (3)**

Lecture—3 hours. Prerequisite: course 203B. Considers application of time series methods to evaluation and forecasting problems. Covers univariate and multivariate ARIMA models and transfer function models. Applications will be in such areas as economics, finance, budgeting, program evaluation, and industrial process control. —S. (S.) Tsai

### **286. Telecommunications and Computer Networks (3)**

Lecture—3 hours. Prerequisite: course 280. Communication system components; common carrier services; design and control of communications networks; network management and distributed environment; local area networks; data security in computer networks. —S. (S.)

### **287. Business Database and Database Marketing (3)**

Lecture—3 hours. Practical introduction to fundamental principles of database management systems and database marketing. Database design. SQL queries. Concepts of database marketing, data warehouse, data visualization and big data analytics. —W. (W.) Yang

### **288. Special Topics in Management of Information Systems (3)**

Lecture—3 hours. Managerial aspects of information systems. Topics stressing applications in organizations chosen from: economics of computers and information systems, decision support systems, management of computer-based information systems, office automation. —Topics

### **290. Topics in General Management (3)**

Seminar—3 hours. Prerequisite: completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Advanced topics in general management. Varied topics to cover more extensively issues discussed in courses 201A and 201B, or current business interest topics in fields of business writing, business communications, development, or workplace processes. May be repeated for credit. —F, W, S, Su. (F, W, S, Su.)

### **291. Topics in Organizational Behavior (3)**

Seminar—3 hours. Prerequisite: completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Advanced topics in social psychology and sociology of organizations. Varied topics to cover more extensively issues discussed in courses 201A and 201B, or current business interest topics in fields of organization design, strategy, development, or workplace processes. May be repeated for credit. —F, W, S, Su. (F, W, S, Su.)

### **292. Topics in Finance (3)**

Seminar—3 hours. Prerequisite: completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Contemporary and emerging issues in finance. Application of modern

techniques of finance to business problems. Use of appropriate electronic database and research techniques. May be repeated for credit. —F, W, S, Su. (F, W, S, Su.)

### **293. Topics in Marketing (3)**

Seminar—3 hours. Prerequisite: completion of all first-year graduate courses at the Graduate School of Management or the equivalent Advanced topics in marketing, which may include marketing research, new product development, brand management, pricing, distribution management, service marketing, hitech marketing, advertising, sales promotions, marketing through the Web. May be repeated for credit. —F, W, S, Su. (F, W, S, Su.)

### **294. Topics in Accounting (3)**

Seminar—3 hours. Prerequisite: completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Contemporary and emerging issues in financial management accounting. Application of modern techniques of evaluation and analysis of financial information. Use of appropriate electronic database and research techniques. May be repeated for credit. —F, W, S, Su. (F, W, S, Su.)

### **295. Topics in Information Technology (3)**

Seminar—3 hours. Prerequisite: completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Applications of information technology to management and management of information technology. Adaptation to the dynamic nature of the field. May be repeated for credit. —F, W, S, Su. (F, W, S, Su.)

### **296. Topics in Technology Management (3)**

Seminar—3 hours. Prerequisite: completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Cyclical nature of innovation and technological change, features of innovative firms and industries, national innovation systems, and impact of information technologies on innovation processes. May be repeated for credit. —F, W, S, Su. (F, W, S, Su.)

### **297. Topics in International Management (3)**

Seminar—3 hours. Prerequisite: completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Broader environment in which U.S. firms and their foreign competitors operate. Integration of material from other topics courses [marketing, strategy, finance, accounting, information technology, technology management] into the international setting. May be repeated for credit. —W. (W.)

### **298. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (S/U grading only.)—F, W, S. (F, W, S.) Bunch

### **299. Individual Study (1-12)**

Prerequisite: consent of instructor. (S/U grading only.)—F, W, S. (F, W, S.) Bunch

## **Professional**

### **401. Crisis Management (1)**

Laboratory/discussion—1 hour. Establishes and explores the defining characteristics of crises. Will learn to anchor crisis management firmly within overall strategic management and also acquire a set of useful tools and techniques for planning for and handling actual crises. (S/U grading only.)—W. (W.)

### **402. Crisis Communications and Reputation Management (1)**

Laboratory/discussion—1 hour. Intended to provide you with an understanding of the framework and tools necessary to successfully address communications and reputation management tasks in a variety of crisis situations. —S. (S.)

### **403. Business Statistics Practicum (1)**

Project—1 hour. Prerequisite: MGT, MGP, or MGB 203A; MGT, MGP, or MGB 203B concurrently or completed. Restricted to students in the MBA program. Applies techniques and concepts in business statistics to real case studies. —F. (F.)

### **404. Organizational Change Management (1)**

Laboratory/discussion—1 hour. Challenges in getting significant changes made in organizations. Learn Organization Change Management (OCM) techniques and discuss case situations where OCM techniques play a role. (S/U grading only.)—F. (F.) Mathur

### **405. Business Literature (1)**

Laboratory/discussion—1 hour. Will examine Business history—historical trends that might influence contemporary business. Some argue that the recent collapse of our financial system might have been averted if business leaders had a better sense of history. (S/U grading only.)—W. (W.)

### **406. Ethical Issues in Management (1)**

Lecture/discussion—1 hour. Explores the philosophical foundation of ethical theory and its recent applications to business situations. Professional codes of ethics, such as those promulgated by educational, managerial, engineering, scientific, medical and legal professional societies, are presented. (S/U grading only.)—W. (W.)

### **407. Storytelling for Leadership (1)**

Lecture/discussion—1 hour. Internalize the fundamental principles behind stories that educate, influence, motivate, inspire, persuade and connect. (S/U grading only.)—Su. (Su.) Charnsupharindr

### **408. The Business of the Media (1)**

Lecture/discussion—1 hour. Focuses on the media industries and how emerging digital technologies are disrupting the way media consumption, distribution and business models work. Will highlight the economics of several media, both news and entertainment. —Su. (Su.) Louie

### **409. Managing Multi-Asset Class Investment Portfolios (1)**

Lecture/discussion—1 hour. Prerequisite: courses 202A, 203A, 205. Examines top down management of multi-asset class portfolios. Topics include bonds, hedge funds, private equity, real estate, commodities, endowments, return generation, performance analysis, credit cycles, financial crises, manager selection, investment policy, and investment careers. Student teams present endowment portfolio recommendations. —S. (S.) Dolan

### **410. Corporate Governance (1)**

Lecture/discussion—1 hour. Covers recent and not-so-recent business and accounting scandals, discuss how corporations can better operate in the interests of shareholders and the public, and learn from people who rely on corporate governance in making investment decisions. (S/U grading only.)—W. (W.)

### **411. Turnaround Management (1)**

Lecture/discussion—1 hour. Evaluate the financial performance of a company, identify opportunities for improvement, propose real solutions to enhance performance, and most important inspire action in staff. (S/U grading only.)—S. (S.)

### **412. International Marketing (1)**

Lecture/discussion—1 hour. Understanding basic concepts of international marketing. Understanding and managing heterogeneous, dynamic, and inter-dependent environments across countries. How to develop and implement an international marketing strategy: where and how to compete, how to adapt your marketing mix. (S/U grading only.)—W. (W.) Peters

### **413. Sustainable Business Ventures: Business and Energy (1)**

Lecture/discussion—1 hour. Introduction to sustainability goals, indicators, values, measurement techniques, and practice how it applies to large and small enterprise. —W. (W.) Jaffe

### **414. Multi-Channel Marketing (1)**

Lecture/discussion—1 hour. Multi-channel marketing strategies empower managers to create value for different customer segments. Covers the necessary concepts to evaluate and select go-to market strategies in order to capitalize on the ubiquity of modern customers. (S/U grading only.)—W. (W.) Rubel

### **415. Climate Risks and Opportunities (1)**

Lecture/discussion—1 hour. Provide a working knowledge of the risks and opportunities arising from climate change and climate policy for businesses. —Su. (Su.) Mazzacurati

### **416. Topics in Private Equity (1)**

Lecture—1 hour. Prerequisite: course 205. Restricted to students in the MBA program. Focuses on the finance principles related to the risk and return of the private equity (PE) industry, valuation of PE target companies, the structuring of leveraged buyouts (LBOs), and the management of portfolio companies. (S/U grading only.)—F. (F.) Yasuda

### **417. Incentives and Controls (1)**

Lecture/discussion—1 hour. Understand how organizations use financial and nonfinancial performance management and incentive systems to motivate people and manage resources. (S/U grading only)—S. (S.)

### **418. Scientific Discovery and Business**

#### **Innovation at Scale in the Food and Agriculture Sector (1)**

Lecture—3 hours. Restricted to students in the MBA program. Scientific discovery and business innovation within the food and agriculture sector profoundly influences the sustainability of society and enterprise competitiveness. Students will learn how business innovation models co-exist antagonistically or synergistically with scientific discovery and its influence on enterprise competitiveness. (S/U grading only.)—F, W, S, Su. (F, W, S, Su.) Schmitz

### **419. Business Strategy Consulting Skills (1)**

Lecture—5 hours. Restricted to students enrolled in the MBA program. Students will learn practical business consulting skills which will help apply strategy theories in the workplace. Students will learn and practice tools to frame and analyze problems, conduct research, communicate findings and navigate client relationships. (S/U grading only.)—F. (F.) Beth-halmy

### **420. Advanced Optimization in a Python-based Modeling Language (1)**

Web virtual lecture—1 hour. Prerequisite: course 252 or MGT 252 or MGP 252, and course 206 or MGT 206 or MGP 206. Restricted to students enrolled in the MBA program. Covers advanced optimization modeling techniques and practical application of modern, scalable modeling language. Techniques will be developed using examples from production planning in a supply chain, but students may explore other areas of application of optimization for their final project. (S/U grading only.)—W. (W.) Woodruff

### **422. Behavioral Finance and Valuation (1)**

lecture—1 hour. Prerequisite: MGT 260 or MGP 260 or course 260, and MGT 261 or MGP 261 or MGP 261 or course 261. Restricted to students enrolled in the MBA program. Investor psychology and market frictions can cause asset prices to deviate from fundamental values, creating profit opportunities for sophisticated investors. The course will cover techniques of financial analysis with the goal of learning how to value assets and identify mispricing. (S/U grading only.)—S. (S.) Scherbina

### **423. Leader as Coach: An Introduction to Coaching Skills for Leaders (1)**

Lecture—1 hour. Restricted to students enrolled in the MBA program. Course introduces the fundamental coaching skills and coaching models that leaders can apply in everyday interactions with their team and colleagues in order to build trust, overcome challenges and help others discover their own full potential. (S/U grading only.) Offered irregularly.—F, W, S. (F, W, S.) Charnsupharindr

### **424. Practicum for Managing People in Modern Organizations (1)**

Project—1 hour. Prerequisite: course 224. Restricted to students in the MBA program. Provides solid grounding in the management of work and the employment relationship. Examines firms' interrelated policies and practices for managing people.—W. (W.) Hsu

**425. Digital Marketing Techniques (1)**

Lecture—1 hour. Restricted to students enrolled in the MBA program. Course provides students with an introduction to digital marketing. The course introduces MBA students to the fundamental aspects and tools of online marketing communication, i.e., how organizations use digital channels to effectively communicate their value propositions to the target customers. (S/U grading only.) Offered irregularly.—S. (S.) Blanchard

**426. The Business of Healthcare (1)**

Lecture—1 hour. Restricted to students enrolled in the MBA program (Business Administration—Working Professional, Business Administration—Bay Area, Business Administration—Full-Time). Course is intended to provide students with an overall understanding of the unique business aspects of the healthcare industry. (S/U grading only.) Offered irregularly.—F, W, S, Su. (F, W, S, Su.) Bird, Murin

**427. The Business of Healthcare (1)**

Lecture—1 hour. Restricted to students enrolled in the MBA program (Business Administration—Working Professional, Business Administration—Bay Area, Business Administration—Full-Time). Course looks at the pitfalls of implementing international strategies, and suggest several accessible, yet powerful frameworks to help international managers implement strategies successfully and completely. (S/U grading only.) Offered irregularly.—F, W, S, Su. (F, W, S, Su.) Katzenstein

**428. Renewable Energy Ventures: Planning, Funding and Regulatory Risk Assessment for Entrepreneurs and Investors (1)**

Lecture—1 hour. Restricted to students enrolled in the MBA program. Advanced innovation lab will introduce students to issues addressed by entrepreneurs and investors in renewable ventures. Lectures, simulations, case studies and practical experience of the presenters will be delivered. Offered irregularly.—Su. (Su.) Schefsky

**429. Detection and Prevention of Asset Misappropriation Fraud in the Workplace (1)**

Lecture—1 hour. Restricted to students enrolled in the MBA program. Course will discuss the fundamentals of fraud detection and prevention in the workplace. Students will learn the major schemes involving workplace fraud, how management can detect fraud and what policies and procedures can be implemented to prevent fraud. Offered irregularly.—F, Su. (F, Su.) Briscoe

**430. Learning From Catastrophes: Lessons for Managers (1)**

Lecture—1 hour. Restricted to students enrolled in the MBA program. Catastrophes unfold in surprisingly similar ways. In this course, students will analyze catastrophes to understand these common patterns and investigate how they can be prevented and mitigated. Students will then apply these lessons to management to gain unconventional insights. Offered irregularly.—Su. (Su.) Pugnetti

**434. Practicum for Pricing (1)**

Project—1 hour. Prerequisite: course 234. Restricted to students in the MBA program. Enhance understanding of the principles and concepts learned in Pricing by (1) teaching the necessary statistical and mathematical skills, and (2) requiring a report for a real Pricing case.—W. (W.)

**440. Integrated Management Project (3)**

Project—3 hours. Prerequisite: first-year core courses of MBA program. Applies classroom learning to solve complex business challenges for real world clients. Student teams learn practical consulting skills while their clients benefit from the student's experience, insights, and work product.—W. (W.) Dinunzio, Lowe

**440A. Integrated Management Project (3)**

Lecture/discussion—3 hours. Prerequisite: first-year core courses of MBA program. Restricted to full-time MBA students. Applies classroom learning to solve complex business challenges for real world clients.

Student teams learn practical consulting skills while their clients benefit from the student's experience, insights, and work product. (Deferred grading only, pending completion of sequence.)—F. (F.)

**440B. Integrated Management Project (3)**

Project—3 hours. Prerequisite: first-year core courses of MBA program. Restricted to full-time MBA students. Applies classroom learning to solve complex business challenges for real world clients. Student teams learn practical consulting skills while their clients benefit from the student's experience, insights, and work product. (Deferred grading only, pending completion of sequence.)—W. (W.)

**442. Practicum for Marketing Communication (1)**

Project—1 hour. Prerequisite: course 242. Restricted to students in the MBA program. Provides experience applying concepts learned in Marketing Communications to a realistic advertising or communication problem faced by firms.—S. (S.)

**443. Practicum for Customer Relationship Management (1)**

Project—1 hour. Prerequisite: course 243. Restricted to students in the MBA program. Hands-on training in applying Customer Relationship Management concepts and metrics to secondary data. Enhances ability to interpret results and decide the right type of marketing actions by requiring an executive report at the end of the quarter.—F. (F.) Aravindakshan

**448. Practicum for Marketing Strategies (1)**

Project—1 hour. Prerequisite: course 248. Restricted to students in the MBA program. Provides opportunities to apply the concepts covered in the Marketing Strategies class through a group project involving the analysis of strategic marketing decisions based on business-related issues, simulation and modeling.—F. (F.) Rubel

**449. Marketing Research Practicum (1)**

Project—1 hour. Prerequisite: course 249. Restricted to students in the MBA program, or in some cases with permission of instructor. Provides opportunities to apply the concepts and methods covered in the Marketing Research class. Hands-on and project-based, work could be either individual or in groups depending on enrollments and/or interests of students.—S. (S.) Bunch

**450. Practicum for Technology Strategy and Competition (1)**

Project—1 hour. Prerequisite: course 250. Restricted to students in the MBA program. In-depth practicum project course. Apply theories, concepts, and models, learned in course 250 to a real-world business problem, through data collection, data analysis, simulation, modeling and post-model interpretation.—W. (W.) Bhargava

**460. Practicum for Corporate Finance and Real Estate (1)**

Project—1 hour. Prerequisite: course 260. Restricted to students in the MBA program. Work in groups to select and value a financial entity. It could be a firm, a sports player, a building, a project, or a patent. Grade based on an in-class presentation and a write-up.—S. (S.) Scherbinia

**461. Practicum for Investment Analysis (1)**

Project—1 hour. Prerequisite: course 261. Restricted to students in the MBA program. Provides practical experience applying concepts learned in Investment Analysis to a realistic portfolio management setting via a hypothetical exercise. Produce a realistic executive summary and presentation of an investment proposal for a hypothetical client.—F. (F.) R. Chen

**464. Practicum for Taxes and Business Strategy (1)**

Project—1 hour. Prerequisite: course 264. Restricted to students in the MBA program. Practical application project drawing from the tax planning theory contained in course 264. Project consists of a business formation and operation, change in organization (incorporation), and movement into multinational and multi-jurisdictional tax.—F. (F.) R. Yetman

**465. Practicum for Venture Capital (1)**

Project—1 hour. Prerequisite: course 265. Restricted to students in the MBA program. Provides an opportunity to apply concepts learned in Venture Capital in a realistic setting. Complete project analyzing a potential investment in a hypothetical venture and prepare an deal term sheet/investment agreement.—S. (S.) Yasuda

**467. Practicum for Teams and Technology (1)**

Project—1 hour. Prerequisite: course 267. Restricted to students in the MBA program. Groups investigate the performance, creativity, conflict, information sharing, and leadership behaviors of a real world team. Provide consulting advice to the team, which not only gives analytic skills, but also builds presentation skills.—S. (S.) Olson

**469. Practicum for Business Intelligence Technologies (1)**

Project—1 hour. Prerequisite: course 269. Restricted to students in the MBA program. Projects applying concepts learned in Business Intelligence Technologies to real business problems.—W. (W.) Yang

**482. Practicum for Supply Chain Management (1)**

Project—1 hour. Prerequisite: MGT, MGP, or MGB 282 is a pre-requisite or co-requisite. Restricted to students in the MBA program. Provides experience applying concepts learned in Supply Chain Management to a realistic management setting via a project.—S. (S.) R. Chen

**490. Directed Group Study Management Practicum (3)**

Lecture/discussion—3 hours. Prerequisite: consent of instructor; sponsorship of a GSM Academic Senate faculty member; approval of graduate adviser. Provides opportunity for students to gain experience in applying business methodologies previously acquired in other GSM courses. May be repeated for credit. Offered irregularly.—Su. (Su.)

**498. Directed Group Study Management Practicum (1-12)**

Project. Prerequisite: consent of instructor; sponsorship of a GSM Academic Senate faculty member, and approval of graduate adviser. Provides the opportunity for students to gain experience in applying business methodologies previously acquired in other GSM courses. May be repeated up to 6 units for credit. (S/U grading only.)—F, W, S. (F, W, S.) Bunch

**499. Directed Individual Study Management Practicum (1-12)**

Project. Prerequisite: consent of instructor; sponsorship of a Graduate School of Management Academic Senate faculty member and approval of graduate adviser. Provides the opportunity for students to gain experience in applying business methodologies previously acquired in other Graduate School of Management courses. (S/U grading only.)—F, W, S. (F, W, S.) Bunch

## Managerial Economics

(College of Agricultural and Environmental Sciences)  
<http://manecon.ucdavis.edu>

**Faculty.** See Agricultural and Resource Economics, on page 153.

**Major Advisers.** Contact Department office.

**Undergraduate Advising Center** for the major, minor, and course offerings (including peer advising) is located in 1176 Social Sciences and Humanities Building, 530-754-9536, <http://manecon.ucdavis.edu>.

### The Major Program

The Managerial Economics major at UC Davis is a disciplinary program combining strong preparation in microeconomic theory and quantitative methods.

It prepares students for the analysis of management and policy issues in business, finance, marketing, production, agriculture, food distribution, natural resources, the environment, resource allocation, and international trade and development. Students specialize in one or more emphases selected from the following: (1) Business Economics focuses on the economic aspects of managerial decision-making essential for solving problems in business, management, marketing, and finance. (2) International Business Economics explores the economic drivers and policy challenges in the major emerging markets and focuses on how these markets are impacting the world economy. (3) Environmental and Resource Economics concentrates on issues related to the use of resources and environmental quality. (4) Agricultural Economics focuses on the economic and policy aspects of production and marketing of foods and fibers.

Students in the Managerial Economics program develop valuable skills and strengths that lead to careers in business and government.

**Internships and Career Alternatives.** Students in Managerial Economics have opportunities to gain additional career information and preparation through internships in a variety of business enterprises and governmental agencies. Graduates qualify for supervisory and management training positions in banking, finance, accounting, commodity and stock brokerages in the private sector, farm and ranch production, food and agricultural processing, sales and service, and a variety of agency career positions in local, state, and federal government. Graduates are well qualified to seek advanced degrees in agricultural and resource economics, economics, business administration, accounting, public policy, or law. For more information, see <http://iccweb.ucdavis.edu>.

**Study Abroad.** The Agricultural and Resource Economics department encourages students to complement their Managerial Economics degree or minor with a study abroad experience. Two upper-division courses, a maximum of 4 units per course, (excluding core courses) may be taken at international campuses. Students must select courses from the pre-approved list at UC Davis Study Abroad and seek pre-approval from a Managerial Economics staff adviser.

**Graduate Study.** Students who meet the admission requirements of Graduate Studies and the Department of Agricultural and Resource Economics may pursue studies leading to the M.S. and Ph.D. degrees. For information on admission to graduate study, degree requirements, consult the Graduate Program Coordinator in the Department of Agricultural and Resource Economics; also see <http://agecon.ucdavis.edu>.

### B.S. Major Requirements:

	UNITS
<b>Major English Requirement .....</b>	<b>8</b>
Choose one course from: Communications 1 or 3 .....	4
University Writing Program 104A .....	4
(The upper-division composition exam will not satisfy this requirement.)	
<b>Preparatory Subject Matter.....</b>	<b>39-41</b>
Agricultural and Resource Economics 18...4	
Economics 1A-1B .....8	
One course from: Plant Sciences 21, Engineering Computer Science 10, 15 or 30.....3-4	
Management 11A-11B .....8	
Mathematics 16A-16B-16C, 17A-17B, or 21A-21B.....8-9	
Statistics 13, 103.....8	
<b>Total Depth Subject Matter .....</b>	<b>52-55</b>
<b>Core .....</b>	<b>20</b>
Agricultural and Resource Economics 100A, 100B, 106, 155 and Economics 101	
<b>Restricted Electives.....</b>	<b>32-35</b>
Choose at least one of the emphases below:	

#### *Business Economics emphases*

Choose at least 16 units from: Agricultural and Resource Economics 112, 118, 119, 136, 157, 171A, 171B.  
Select the remaining 16 units from the above list or from Agricultural and Resource Economics 115A, 115B, 120, 121, 130, 132, 138, 139, 140, 143, 144, 145, 146, 150, 156, 175, 176, 194HA-194HB, Economics 115A, 115B, 121A, 121B, 151A, 151B, 160A, 160B.

#### *International Business Economics emphases*

Choose at least 20 units from Agricultural and Resource Economics 115A, 115B, 138, 139, 146, Economics 115A, 115B, 160A, 160B, 171.

Select the remaining 12 units from the above list or from Agricultural and Resource Economics 130, 171A, 171B, 175, 176, Economics 121A, 121B, Political Science 130.

#### *Environmental and Resource Economics emphases*

Agricultural and Resource Economics 175 and 176 .....8  
Choose at least 20 units from: Agricultural and Resource Economics 120, 132, 138, 140, 145, 146, 150, 156, Economics 125, 130 Environmental Science and Policy 168A, 168B, 178.

Select the remaining 4 units from the above list or upper-division courses in Agricultural and Resource Economics, Economics, or Environmental Science and Policy 160, 161, 163, 165N, 166N, 167, 171, 172, 173 or Environmental Toxicology 138.

#### *Agricultural Economics emphases*

Choose at least 16 units from Agricultural and Resource Economics 120, 121, 130, 132, 138, 139, 140, 145, 150.

Select the remaining 16 units from the above list or upper division courses in Agricultural and Resource Economics and/or Economics.

\* Students must attain a major GPA of at least a C average (2.00) in courses taken for depth subject matter (core and restricted electives). These courses must be taken for a letter grade. All restricted elective courses taken will be calculated as part of the major GPA, including courses with F grades that have not been repeated.

### Total Units for the Major .....99-104

### Minor Program Requirements:

	UNITS
<b>Managerial Economics .....</b>	<b>24</b>

#### Agricultural and Resource Economics 100A, 100B, and 106 .....

12  
Select the remaining 12 units from

Agricultural and Resource Economics 107,

112, 130, 136, 138, 139, 143, 145, 146,

150, 155, 156, 157, 171A, 171B, 175,

176.

NOTE: Preparation for the minor includes Economics 1A, 1B; Mathematics 16A-16B-16C or 17A-17B or 21A-21B; Statistics 13 and 103.

Prerequisites for courses taken for the minor are mandatory and students should plan accordingly. One upper-division class to satisfy the minor may be taken for passed/not passed grading. All minor courses must be taken in residence. Two upper-division courses, a maximum of 4 units per course, may be taken through UC Study Abroad. Students must seek pre-approval from a Managerial Economics staff adviser for any international courses.

### Marine and Coastal Science

## Marine and Coastal Science

The major in Marine and Coastal Science focuses on the interdisciplinary nature of marine sciences by exposing students to core, breadth, and focus area courses in the discipline, in addition to a strong foundation of science preparatory material. The major builds upon existing strengths at UC Davis in marine and coastal sciences as well as field-based courses offered at Bodega Marine Laboratory to provide students a unique, interdisciplinary, "hands on" education. Advising is provided by the Department of Earth and Planetary Sciences for interested students.

**The Program.** The major begins with introductory courses in mathematics, chemistry, physics, biology, and earth sciences. These are followed by core courses in Marine Science. The major requirements provide focus and breadth, so that each student gains mastery in one area and broad exposure to many facets of Marine and Coastal Science. Focus and Breadth areas include: Coastal Environmental Processes, Marine Ecology and Organismal Biology, Marine Environmental Chemistry, and Oceans and the Earth System.

In this major, students will be exposed to the foundation disciplines within marine science (biology, chemistry, geology, physics) as well as modern issues facing marine and coastal environments; e.g., climate change, pollution, carbon cycling, conservation. The major requires field experience, independent research or internship, and concludes with a capstone course featuring current research in marine science. These integrative experiences will require students to synthesize the interdisciplinary topics that they have encountered through this degree program. The mastery achieved provides a strong foundation for future careers in academic science, government, policy, and the private sector.

**Internships and Career Alternatives.** A B.S. in Marine and Coastal Science will provide students with knowledge and practical experience needed to pursue careers in marine science (government, private sector, research) and/or advanced degree programs. The major program includes both research and internship experiences to help prepare students for these career paths.

**Advising.** Students majoring in Marine and Coastal Science are strongly encouraged to meet with their faculty adviser (assigned, based upon Focus Area choice) once per year to review their coursework plans. Staff advising is available through the Department of Earth and Planetary Sciences, and student peer advisers are available. Faculty advisers include: Tessa Hill (College of Letters and Science), Anne Todgham and John Largier (College of Agricultural and Environmental Sciences), and Brian Gaylord (College of Biological Sciences).

The student's chosen Focus Area will determine the college into which the student is admitted, the college where the degree is awarded, and the associated department:

- Coastal Environmental Processes.** College of Agricultural and Environmental Sciences; Environmental Science & Policy

- Marine Ecology & Organismal Biology.** College of Biological Sciences; Evolution & Ecology

- Marine Environmental Chemistry.** College of Agricultural and Environmental Sciences; Environmental Toxicology

- Oceans and the Earth System.** College of Letters and Science; Earth and Planetary Sciences

### B.S. Major Requirements:

† denotes courses only offered at Bodega Marine Laboratory.

	UNITS
<b>Preparatory Subject Matter .....</b>	<b>51-63</b>

Biological Sciences 2A-2B-2C.....15

Fall 2011 and on Revised General Education (GE): AH=Arts and Humanities; SE=Science and Engineering; SS=Social Sciences;

ACGH=American Cultures; DD=Domestic Diversity; OL=Oral Skills; QL=Quantitative; SL=Scientific; VL=Visual; WC=World Cultures; WE=Writing Experience

Pre-Fall 2011 General Education (GE): ArtHum=Arts and Humanities; SciEng=Science and Engineering; SocSci=Social Sciences; Div=Domestic Diversity; Wrt=Writing Experience

Quarter Offered: F=Fall, W=Winter, S=Spring, Su=Summer; 2017-2018 offering in parentheses

Chemistry 2A-2B-2C .....	15
Mathematics 16A-16B-16C, 17A-17B-17C, or 21A-21B-21C .....	9-12
Note: Students in Marine Ecology & Organismal Biology focus area must take 17A-17B-17C or 21A-21B.	
Physics 7A-7B-7C or 9A-9B-9C .....	12-15
Chemistry 8A-8B for students in Marine Ecology & Organismal Biology focus area .....	6
Evolution & Ecology 12 and Geology 16 are strongly recommended.	

**Depth Subject Matter ..... 46-75**

Geology 116N (Environmental Science & Policy 116N) .....	3
Statistics 100 or 102 .....	4
Two courses from: Geology 150A (Environmental Science & Policy 150A), Geology 150B (Environmental Science & Policy 150B), †Geology 150C (Environmental Science & Policy 150C) ..	7-8
Two courses from: Atmospheric Sciences 120, Environmental Science and Policy 100, 110, Environmental Toxicology 101, Evolution and Ecology 100, 101, 112+112L, Hydrology 103N .....	8-9
Evolution & Ecology 111 (Environmental Science and Policy 111) .....	1
Marine Ecology & Organismal Biology focus area: Biological Sciences 101, 102+103 or 105, and 104 .....	10-13
Courses cannot be utilized to fulfill multiple requirements, with the exception that any Bodega Marine Laboratory course simultaneously fulfills the field requirement below.	

**Focus Area Requirement ..... 12**

Complete at least four courses from one category  
below, totaling at least 12 units.

**Coastal Environmental Processes.** Emphasis  
on processes and environments of the coastal  
zone, and the strong physical-biological connec-  
tion that exists here. Courses highlight the critical  
terrestrial-marine interface and fundamental phys-  
ical processes in the coastal zone.

This focus area requirement can be fulfilled using:  
Atmospheric Sciences \*121A, \*121B, 158, Envi-  
ronmental Toxicology \*102A, Environmental Sci-  
ence & Policy \*152, 155, 155L, 166N, Geology  
\*156, 182, Hydrology 103N, 134, \*143,  
\*144, Wildlife, Fish & Conservation Biology  
\*157.

\* Some courses may require additional prerequisites,  
such as: Atmospheric Sciences 120, Math  
21D, Chemistry 8B, Environmental Science and  
Policy 100, Hydrology 103N, Hydrology 141,  
Hydrology 145, Engineering: Civil and Environ-  
mental 144.

**Marine Ecology and Organismal Biology.**

Focus on physiological adaptations to the marine  
environment, and the biology of marine species from  
the molecular to population levels. Courses include  
emphasis on the ecological processes that determine  
the distribution and abundance of marine organ-  
isms, and the patterns and mechanisms of evolution  
in the ocean.

The focus area requirement can be fulfilled using:  
Animal Science \*131, Biological Sciences †122,  
†122P, Environmental Science & Policy 100,  
121, †124, \*155, 155L, Evolution & Ecology  
100, 101, \*106, 112, 112L, \*114, 115,  
Environmental Toxicology \*127, Neurobiology,  
Physiology, and Behavior †141 and †141P,  
Wildlife, Fish and Conservation Biology 120,  
120L, 121, 122, 130 \*Some of these courses  
may require additional prerequisites, such as:  
Environmental Science and Policy 100, Evolution  
and Ecology 112, Wildlife Fish Conservation  
120, Environmental Toxicology 101.

**Marine Environmental Chemistry.** Emphasis  
on major themes in marine chemistry, geochemistry,

the carbon cycle, and contaminant fate and trans-  
port.

The focus area requirement can be fulfilled using:  
Chemistry 100, Environmental Toxicology \*101,  
\*102A, \*120, \*127, Civil & Environmental  
Engineering 140, 140L, Geology \*148, 182,  
Hydrology 134, 141, Wildlife, Fish and Conser-  
vation Biology 153

\* Some courses may require additional prerequi-  
sites, such as: Chemistry 8B, Geology 50, 60,  
Hydrology 145, Civil and Environmental Engi-  
neering 144.

**Oceans and the Earth System.** A study of our  
changing oceans in the context of earth system his-  
tory, including climate change, paleoceanography,  
ecological shifts, conservation, and marine policy.

The focus area requirement can be fulfilled using:  
Atmospheric Sciences 116, Environmental Sci-  
ence and Management 120, 121, Environmental  
Science & Policy \*110, 161, 162, 166N, \*169,  
198, Evolution & Ecology \*120, Geology 107,  
107L, 108, 109, 109L, 144, International Rela-  
tions \*131, Science & Society 120, Wildlife, Fish  
and Conservation Biology 154

\* Some courses may require additional prerequi-  
sites, such as: Atmospheric Sciences 60, Chemis-  
try 8A,B, Geology 1, Economics 1A, Hydrology  
145, Environmental Resource Sciences 100, Inter-  
national Relations 1

**Breadth Requirement ..... 8**

Complete one course from each category below that  
is not the student's chosen Focus Area, totaling at  
least 8 units.

**Coastal Environmental Processes.** The breadth  
requirement can be fulfilled using the following  
courses: Atmospheric Sciences 158, Environmental  
Science & Policy \*152, \*155, Geology 182, Wild-  
life, Fish & Conservation Biology \*157

**Marine Ecology and Organismal Biology.**

The breadth requirement can be fulfilled using the  
following courses: Environmental Science & Policy  
124, \*155, Evolution & Ecology \*106, \*114,  
115, Environmental Toxicology \*127, Neurobiol-  
ogy, Physiology, and Behavior †141+ †141P

**Marine Environmental Chemistry.** The breadth  
requirement can be fulfilled using the following  
courses: Environmental Toxicology \*120, Chemistry  
100, Geology 182, Hydrology 134, 141

**Oceans and the Earth System.** The breadth  
requirement can be fulfilled using the following  
courses: Atmospheric Sciences \*116, Environmental  
Science & Policy 166N, Evolution & Ecology \*120,  
Geology 107, 108, Wildlife, Fish and Conservation  
Biology 154

\* Some courses may require additional prerequi-  
sites; see above.

**Field Requirement ..... 0-14**

The Field Requirement provides exposure to  
field techniques, experimental design, and the  
marine environment itself. It is highly  
recommended that students fulfill this  
requirement by residence at Bodega Marine  
Laboratory for one or more courses; see  
courses denoted with †. Bodega Marine  
Laboratory courses may simultaneously fulfill  
an additional requirement in categories  
above ..... 0 OR

Alternatively, students may fulfill the Field  
Requirement by taking two of the following  
courses; these courses cannot fulfill multiple  
requirements: Geology 109L, Evolution and  
Ecology 112L, 115, Environmental Science &  
Policy 123, 151L, Geology 182, Wildlife,  
Fish & Conservation Biology 100, 102L,  
157 ..... 4-14

**Internship/Research ..... 3**

Biological Sciences 124, Geology 192, Environmental  
Science & Policy 192, Evolution and Ecology  
192, 199 or equivalent.

**Total Units for the Major (by chosen Focus  
Area):**

<b>Coastal Environmental Processes....</b>	<b>97-119</b>
<b>Marine Ecology &amp; Organismal Biology.....</b>	<b>113-138</b>
<b>Marine Environmental Chemistry ...</b>	<b>97-119</b>
<b>Oceans and the Earth System.....</b>	<b>97-119</b>

**Master of Education  
(M.Ed.)  
(A Graduate Group)**

The Master of Education (M.Ed.) program is no longer admitting students; admissions are suspended.

**Master of  
Professional  
Accountancy  
(A Graduate Group)**

Robert Yetman, Ph.D., Chairperson of the Group

**Group Office.** Gallagher Hall  
530-752-7658; Fax 530-754-9355;  
<http://gsm.ucdavis.edu/>  
*master-professional-accountancy*

**Faculty**

Shannon W. Anderson, Ph.D., Professor  
(Graduate School of Management)

Brad Barber, Ph.D., Professor  
(Graduate School of Management)

Joseph Chen, Ph.D., Associate Professor  
(Graduate School of Management)

Roger Edelen, Ph.D., Associate Professor  
(Graduate School of Management)

Paul A. Griffin, Ph.D., Professor  
(Graduate School of Management)

Robert Marquez, Ph.D., Professor  
(Graduate School of Management)

Hollis A. Skaife, Ph.D., Professor  
(Graduate School of Management)

Victor Stango, Ph.D., Associate Professor  
(Graduate School of Management)

Ayako Yasuda, Ph.D., Associate Professor  
(Graduate School of Management)

Michelle Yetman, Ph.D., Associate Professor  
(Graduate School of Management)

Robert Yetman, Ph.D., Professor  
(Graduate School of Management)

Paul Wong, Ph.D., Assistant Professor  
(Graduate School of Management)

**Affiliated Faculty**

Will Snyder, M.B.A, C.P.A., Executive Director  
(Graduate School of Management)

**Graduate Adviser.** Contact the Group office.

**Courses in Master of Professional  
Accountancy (ACC)****Graduate****201. Financial Reporting (4)**

Lecture—4 hours. Restricted to Master of Profes-  
sional Accountancy graduate students. Coverage  
includes the fundamentals of accounting and report-  
ing economic events and transactions. Emphasizes  
the preparation of balance sheets, income state-  
ments, statements of cash flow, and statements of  
stockholders' equity. Not open for credit to students  
who have taken any Management 200A.—F. (F.) Yet-  
man

**203. Intermediate Financial Reporting (4)**

Lecture—4 hours. Prerequisite: course 201 or Man-  
agement 200A. Restricted to students enrolled in the  
Master of Professional Accountancy degree pro-  
gram. Focuses on the preparation of complex financial  
statements. Topics include accounting

recognition, measurement, and disclosure, as well as the theoretical foundations of and motivations for financial reporting choices. Not open for credit to students who have taken any Management 200A. —W. (W.) Ekanayake

### **205. Advanced Financial Reporting (4)**

Lecture—4 hours. Prerequisite: course 203. Restricted to graduate students in Graduate School of Management. Advanced treatment of recognition, measurement, and disclosure including pensions, accounting for income taxes, mergers and acquisitions, consolidations, special-purpose entities, and foreign subsidiaries. Includes accounting for governmental and nonprofit entities, as well as advanced treatment of international accounting standards. —S. (S.) Skaife

### **211. Tax Reporting and Analysis (4)**

Lecture—4 hours. Restricted to Master of Professional Accountancy graduate students. Introduction to the taxation of business entities and their related transactions, with an emphasis on the details of tax law and tax reporting requirements. Topics include individual, partnership, and corporate taxation, as well as tax theory. Not open for credit to students who have completed any Management 264. —F. (F.) Yetman

### **213. Intermediate Tax Reporting and Analysis (4)**

Lecture—4 hours. Prerequisite: course 211; any Management 264. Restricted to graduate students in the Graduate School of Management. Detailed analysis of federal taxation of individuals. Topics include the timing of income recognition, deductions and credits for tax purposes, as well as the basics of property transactions. —W. (W.) Snyder

### **215. Advanced Tax Reporting and Analysis (4)**

Lecture—4 hours. Prerequisite: course 213. Restricted to graduate students in Graduate School of Management. Advanced treatment of complex tax transactions and entities. Topics include aspects of federal taxation of entities and the applicable impact upon individual taxpayers. Coverage includes basis analysis as applicable to pass through entities and an introduction to professional responsibilities. —S. (S.) Snyder

### **217. Taxation of Individuals, Property, and Estates (4)**

Lecture—4 hours. Prerequisite: course 213. Restricted to graduate students in Graduate School of Management. In-depth analysis of individual income tax issues and property transactions including non-taxable exchanges, compensation, gifts, and transfer taxes. Expanded analysis of multistate tax issues. Emphasis is on the interrelationships of complex individual transactions as well as planning techniques. —S. (S.)

### **219. Taxation of Business Entities (4)**

Lecture—4 hours. Prerequisite: course 213. Restricted to graduate students in Graduate School of Management. Analysis of detailed business entity tax issues including basis calculations, alternative minimum taxation, multistate and multinational taxation, stock transactions, and mergers and acquisitions. Tax planning for entities and relationships between business entities and their owners. Offered irregularly. —F. (F.)

### **231. Analysis and Use of Accounting Reports (4)**

Lecture—4 hours. Prerequisite: course 203. Restricted to students enrolled in the Master of Professional Accountancy degree program. Evaluation of complex financial accounting reports by managers and persons outside the firm, such as investors, creditors, and financial analysts. Topics include cash flow vs. income measurement, ratio and valuation analysis, and the effects of international accounting standards. Not open for credit to students who have completed any Management 272. —S. (S.) Skaife

### **241. Auditing and the Accounting Profession (4)**

Lecture—4 hours. Prerequisite: course 201; any Management 200A. Restricted to Graduate School of Management students. Introduction to the audit environment, professional standards, the accounting profession, and the professional responsibilities of accountants. Integrate audit topics across the areas of financial, cost, tax and systems accounting. (S/U grading only.) —F. (F.) Snyder

### **243. Auditing and Attestation Services (4)**

Lecture—4 hours. Prerequisite: course 241. Restricted to graduate students in Graduate School of Management. Advanced treatment of the audit process and environment. Topics include audit planning and performance, evidence, internal controls, professional standards, and audit reports. Reviews, compilations and attestation services are examined, as are governmental agency audits. —S. (S.) Ekanayake

### **251. Managerial Accounting and Controls (4)**

Lecture—4 hours. Prerequisite: course 201; any Management 200A. Restricted to graduate students in the Graduate School of Management. Analysis of management accounting systems including cost accounting, performance measurement, and compensation and reward systems. Focuses on the production of information useful for managerial decision-making, as well as the design of these systems. Not open for credit to students who have completed any Management 271. —W. (W.) Anderson

### **253. Accounting Information and Control Systems (4)**

Lecture—4 hours. Prerequisite: course 201 or any Management 200A. Restricted to graduate students in Graduate School of Management. Analysis of information systems used for accounting, record-keeping, and control. Topics include the regulatory requirements of accounting control systems as well as their implementation and auditing considerations. Not open for credit to students who have taken any Management 271. —W. (W.)

### **261. Communications for Professional Accountants (4)**

Lecture—4 hours. Prerequisite: course 201 or any Management 200A. Restricted to graduate students in the Graduate School of Management. Overview of written and oral professional communications with an emphasis on structuring and documenting audits and reports, understanding audiences (investors, creditors, regulators, and other stakeholders), and consideration of ethical and regulatory responsibilities. Not open for credit to students who have taken any Management 268. —W. (W.) Kennedy

### **271. Accounting Ethics (4)**

Lecture—4 hours. Prerequisite: course 201; any Management 200A. Restricted to Graduate School of Management students. Analysis of accountants' professional responsibilities and ethics. Topics include the behavioral foundations of ethics in a business environment, how those elements affect accountants' integrity, objectivity, and independence. Professional standards related to accountants' conduct are also covered. —F. (F.) Yetman

## **Master of Preventive Veterinary Medicine (A Graduate Group)**

Ashley Hill, D.V.M., M.P.V.M., Ph.D., Chairperson of the Group

**Group Office.** 5215 Vet Med 3A  
530-752-2657; Fax 530-754-9161;  
<http://www.vetmed.ucdavis.edu/mpvm/index.cfm>

### **Faculty**

John Adaska, D.V.M., M.P.V.M., Ph.D., Associate Professor of Clinical  
(Pathology, Microbiology & Immunology)

Sharif Aly, BVSc, M.P.V.M., Ph.D., Assistant Professor  
(Population Health and Reproduction)

Robert Atwill, D.V.M., M.P.V.M., Ph.D., Professor  
(Population Health and Reproduction)

Chris Barker, MS, Ph.D., Assistant Adjunct Professor  
(Pathology, Microbiology & Immunology)

Walter Boyce, D.V.M., M.S., Ph.D., Professor  
(Pathology, Microbiology & Immunology)

David Bunn, B.S., M.S., Ph.D., Assistant Adjunct Professor (Animal Science)

Munashie Chigerwe, BVSc, MPH, Ph.D., Assistant Professor (Medicine & Epidemiology)

Bruno Chomel, Dr.Sc, D.V.M., M.S., Ph.D., Professor  
(Population Health & Reproduction)

Mary Christopher, D.V.M., Ph.D., Professor  
(Pathology, Microbiology & Immunology)

Deana Clifford, D.V.M., M.P.V.M., Ph.D., Assistant Clinical Professor  
(Medicine & Epidemiology)

Beata Crossley, D.V.M., M.P.V.M., Ph.D., Assistant Professor of Clinical  
(Medicine & Epidemiology)

Janet Foley, D.V.M., M.S., Ph.D., Professor  
(Medicine & Epidemiology)

Kirsten Gilardi, D.V.M., Health Sciences Clinical Professor  
(Medicine & Epidemiology)

Ashley Hill, D.V.M., M.P.V.M., Ph.D., Associate Professor of Clinical  
(Medicine & Epidemiology)

Christine Kreuder Johnson, D.V.M., M.P.V.M., Ph.D., Associate Professor  
(Medicine & Epidemiology)

Terry Lehenbauer, D.V.M., M.P.V.M., Ph.D., Associate Professor  
(Population Health & Reproduction)

Chin-Shang Li, Ph.D., Professor  
(Public Health Sciences)

John Madigan, D.V.M., M.S., Professor  
(Medicine & Epidemiology)

Esteban Soto Martinez, Ph.D., Associate Professor  
(Medicine & Epidemiology)

Beatriz Martinez-Lopez, D.V.M., M.P.V.M., Ph.D., Assistant Professor (Medicine & Epidemiology)

Bret McNabb, M.P.V.M., D.V.M., (Livestock Herd Health and Reproduction Service)

Jonna Mazet, D.V.M., M.P.V.M., Ph.D., Professor  
(Medicine & Epidemiology)

Brenda McCowan, Ph.D., Professor  
(Population Health & Reproduction)

Woutrina Miller, D.V.M., M.P.V.M., Ph.D., Associate Professor  
(Medicine & Epidemiology)

Pramod Pandey, MTech, M.S., Ph.D., Lecturer and Assistant Specialist in Cooperative Extension  
(Population Health & Reproduction)

Alda Pires, D.V.M., M.P.V.M., Ph.D., Assistant Specialist and Lecturer (Population Health & Reproduction)

Maurice Pitresky, M.S., D.V.M., M.P.V.M., Lecturer and Assistant Specialist in Cooperative Extension  
(Population Health & Reproduction)

Heidi Rossow, Ph.D., Assistant Professor  
(Population Health & Reproduction)

Joan Rowe, D.V.M., M.P.V.M., Ph.D., Professor  
(Population Health & Reproduction)

Noelia Silva del Rio, D.V.M., Ph.D., Lecturer and Assistant Specialist in Cooperative Extension  
(Population Health & Reproduction)

Susan Stover, D.V.M., Ph.D., Professor  
(Physiology & Cell Biology)

### **Emeritus Faculty**

Thomas Farver, M.S., Ph.D., Professor Emeritus  
(Population Health & Reproduction)

David Hird, D.V.M., M.P.V.M., Ph.D., Professor Emeritus  
(Medicine & Epidemiology)

Donald Klingborg, D.V.M., Professor Emeritus  
(Population Health & Reproduction)

Mark Thurmond, D.V.M., M.P.V.M., Ph.D., Professor  
Emeritus  
(*Medicine & Epidemiology*)

**Graduate Adviser.** Contact the Group office.

## Courses in Preventive Veterinary Medicine (MPM)

### Graduate

#### 200. Introduction to Information Management for Epidemiologists (1)

Laboratory—1 hour. Restricted to students in the Master of Preventive Veterinary Medicine program. Introduction to practical application of epidemiological methods to solve problems involving population health data. Emphasis on using worksheet/database software tools for organizing, analyzing, reporting, and interpreting data. Ten, three-hour sessions. —Su. (Su.) Lehenbauer

#### 201. Emerging Issues at the Interface of Animal, Human, and Ecosystem Health (2.5)

Lecture—1 hour; discussion—1.5 hours. Class size limited to 35 students. Introduce one health topics emphasizing relationships between environmental, animal and human health. Topics include ecosystem change and impacts on animals and humans, cross-species disease transmission and approaches for addressing critical data gaps to inform ecosystem health and disease prevention. —F. (F.) Johnson

#### 202. Medical Statistics I (4)

Lecture—15 sessions; laboratory—10 sessions. Prerequisite: MPVM or MPH standing, or consent of the instructor. Restricted to 80 students. Basic statistics in clinical, laboratory and population medicine: descriptive statistics; probability; binomial, Poisson, normal, t, F, and Chi-square distributions; sampling distributions; parameter estimation; hypothesis testing; elementary nonparametric methods, simple linear regression and correlation; life table construction and analysis. —Su. (Su.)

#### 203. Medical Statistics II (4)

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 202 (or equivalent) or consent of instructor. Continuation of course 202. Analysis of variance in biomedical sciences; nonparametric methods; multiple regression; unconditional logistic regression; biomedical applications of statistical methods. Microcomputer applications in population medicine to reinforce principles that are taught in lecture. Required for students in the Preventive Veterinary Program Graduate Group (PVM) and the Masters of Public Health Program (MPH).

#### 204. Medical Statistics III (4)

Lecture—3 hours; laboratory—2 hours. Continuation of course 203. Selecting the best regression equation, conditional logistic regression, Poisson regression, survival analysis, analysis of time dependent variation and trends. Microcomputer applications in population medicine to reinforce principles that are taught in lecture. —W. (W.)

#### 205. Principles of Epidemiology (4)

Lecture—4 hours. Prerequisite: course 202, an introductory statistics course, or consent of the instructor. Continuation of course 202. Basic epidemiologic concepts and approaches to epidemiologic research, with examples from veterinary and human medicine, including outbreak investigation, infectious disease epidemiology, properties of tests, and an introduction to epidemiologic study design and surveillance. (Same course as Epidemiology 205). —F. (F.)

#### 206. Epidemiologic Study Design (4)

Lecture—30 sessions; discussion—9 sessions; laboratory—2 sessions. Prerequisite: course 205 or consent of instructor. Builds on concepts presented in course 205. Concepts of epidemiologic study design—clinical trials, observational cohort studies, case control studies—introduced in course 205A are covered in more depth, using a problem-based format. Discussion of published epidemiologic studies. (Same course as Epidemiology 206). —F. W. S. (F. W. S.) Atwill

## 207. Applied Epidemiologic Problem Solving (1)

Laboratory/discussion—2 hours. Integration of epidemiologic and statistical methodology in a problem-solving approach to contemporary animal population health issues. Data validation and manipulation. —W. (W.) Martinez-Lopez

### Professional

#### 402. Medical Statistics I (5)

Lecture—37 sessions; laboratory—13 sessions. Prerequisite: MPVM standing in the School of Veterinary Medicine or consent of instructor. Statistics in clinical, laboratory and population medicine: graphical and tabular presentation of data; probability; binomial; Poisson, normal, t, F, and Chi-square distributions; elementary nonparametric methods; simple linear regression and correlation; life tables. Microcomputer applications of statistical procedures in population medicine. —F. Su. (F. Su.) Farver

#### 403. Medical Statistics II (3)

Lecture—20 sessions; laboratory—10 sessions. Prerequisite: Prerequisite: MPVM standing in the School of Veterinary Medicine and/or successful completion of course 402 (or equivalent) or consent of instructor. Analysis of variance in biomedical sciences; nonparametric methods; multiple regression; biomedical applications of statistical methods. Microcomputer applications to reinforce principles that are taught in lecture. Continuation of course 402. —F. W. (F. W.) Farver

#### 404. Medical Statistics III (4)

Lecture—3 hours; laboratory—2 hours. Prerequisite: MPVM standing in the School of Veterinary Medicine and/or successful completion of course 403 (or equivalent) or consent of instructor. Continuation of course 403. Analysis of time dependent variation and trends, analysis of multiway frequency tables; logistic regression; survival analysis selecting the best regression equation; biomedical applications. —S. (S.)

#### 405L. Epidemiology Laboratory (1)

Lecture—1 session; lecture/discussion—1 session; laboratory—1 session. Prerequisite: MPVM standing in the School of Veterinary Medicine or consent of instructor. Practical application of epidemiological methods using the microcomputer as a tool to solve problems. Utilizes spreadsheets and databases as tools to organize and analyze data. Emphasize epidemiological methods introduced in course 405. Data sets provided. —F. Su. (F. Su.) Lehenbauer

#### 408A. Veterinary Research: Planning and Reporting (2)

Lecture—20 sessions. Prerequisite: MPVM standing in the School of Veterinary Medicine or consent of instructor. Planning, critical analysis, ethics, and written and oral communication of veterinary research. —Foley

#### 408B. Veterinary Research: Planning and Reporting (1)

Lecture—10 sessions. Prerequisite: MPVM standing in the School of Veterinary Medicine or consent of instructor. Planning, critical analysis, ethics, and written and oral communication of veterinary research. —F. W. S. (F. W. S.) Christopher

#### 408C. Veterinary Research: Planning and Reporting (1)

Discussion—10 sessions. Prerequisite: Master of Preventive Veterinary Medicine standing in the School of Veterinary Medicine or consent of instructor; completion of course 408A and course 408B. Planning, critical analysis, ethics, and written and oral communication of veterinary research. —S. (S.) Chomel

#### 410. Animal Health Policy and Risk Communication (1)

Discussion—10 sessions. Prerequisite: MPVM standing in the School of Veterinary Medicine or consent of instructor. International, national and state policy issues affecting veterinary medicine, how policy is made, organizational cultures, the role of science in policy-making, ten best practices in risk/crisis com-

munication, message-mapping for the public and policy-makers, and effective meeting management. —F. (F.) Mazet

## 426. Applied Epidemiologic Problem Solving (1)

Laboratory—10 sessions. Prerequisite: MPVM standing in the School of Veterinary Medicine or consent of instructor. Integration of epidemiologic and statistical methodology in a problem-solving approach to contemporary animal population health issues. Data validation and manipulation; descriptive statistical analysis using spreadsheets, database management, and Epi Info software. Builds on skills learned in courses 405L and 406. —W. (W.)

## Maternal and Child Nutrition (Department of Nutrition)

Francene M. Steinberg, Ph.D., Chairperson of the Department

**Department Office.** 3135 Meyer Hall  
530-752-4630;  
<http://www.extension.ucdavis.edu/nutrition>

### Faculty

Faculty members are listed on the website.

**Graduate Study.** The Nutrition Department offers the degree of M.A.S. in Maternal and Child Nutrition. This program consists of three required six-unit core courses (Nutrition During Pregnancy, Lactation and Infant Nutrition, and Child and Adolescent Nutrition), six to eight units of special topics seminars, two units of electives, and a six-unit student project (produced in consultation with a three-member guidance committee) for a total of 36 units. Each of the core courses will comprise 10 weeks of in-class instruction twice per week for two-and-a-half hours per meeting. Classes will also include online discussion of related material and readings.

Each student will be assigned a three-member guidance committee consisting of two members of the teaching faculty and an additional qualified faculty member to advise the student in identifying a student project.

**Preparation.** Admission to the program requires a bachelor's degree with prior course work that includes (or is comparable to): one year of general chemistry, two quarters of organic chemistry, a course in statistics, one course in general physiology, and two quarters of the biochemistry of nutrition.

**Graduate Advisers.** Kathryn G. Dewey, Ph.D., Professor (*Nutrition*), Jane Heinig, Ph.D., Academic Administrator (*Nutrition*)

**Courses in Maternal and Child Nutrition.**  
See courses under *Nutrition*, on page 490.

## Mathematical and Physical Sciences

(College of Letters and Science)

Jesus De Loera, Ph.D., Program Director

**Program Office.** 118 Everson Hall

### Committee in Charge

Andreas J. Albrecht, Ph.D. (*Physics*)

Joel Hass, Ph.D. (*Mathematics*)

Jacquelyn Gervay-Hague, Ph.D. (*Chemistry*)

Hans-Georg Müller, Ph.D. (*Statistics*)

Howard J. Spero, Ph.D.  
(*Earth and Planetary Sciences*)

### The Program of Study

The Division of Mathematical and Physical Sciences teaches students to use experimental studies and the-

oretical analyses to find solutions to real world problems. Students learn to address issues such as cleaning up the environment, preserving natural resources and creating innovative materials for the future. From the study of atoms to the examination of distant galaxies, from abstract number theory to the development of new chemical compounds, the division provides students with the skills to build the world of tomorrow.

The program in Mathematical and Physical Sciences provides an organizational structure within the College of Letters and Science for facilitating the development of innovative curricular initiatives across the mathematical and physical sciences, including offering broadly conceived, integrative undergraduate and graduate-level courses. The program also may house resident faculty pursuing interdepartmental research and teaching in this area of inquiry.

## Courses in Mathematical and Physical Sciences (MPS)

### Lower Division

#### 1. General Science: Science in the News (4)

Lecture—3 hours; laboratory/discussion—1 hour. Prerequisite: lower division standing. Basic principles in science including numeracy, scale, energy, and time; the scientific method; good and bad science. Emphasis on science topics recently in the news. Offered irregularly. GE credit: SciEng.—F, W, S. (F, W, S.)

#### 11A. Mathematical and Physical Sciences Seminar (2)

Lecture—2 hours. Prerequisite: mentorship for undergraduate research participants in the physical and mathematical sciences. Research and writing in the mathematical and physical sciences. Presentations by various science faculty members. Offered irregularly.—F, W, S. (F, W, S.)

#### 11B. Mathematical and Physical Sciences Seminar (2)

Lecture—2 hours. Prerequisite: mentorship for undergraduate research participants in the physical and mathematical sciences. Research and writing in the mathematical and physical sciences. Presentations by various science faculty members. Offered irregularly.—F, W, S. (F, W, S.)

## Mathematics

### See Mathematics; and Applied Mathematics (A Graduate Group), on page 176.

## Mathematics

(College of Letters and Science)

Dan Romik, Ph.D., Chairperson

**Department Office.** 1130 Mathematical Sciences Bldg.  
530-752-0827;  
[studentservices@math.ucdavis.edu](mailto:studentservices@math.ucdavis.edu);  
<http://www.math.ucdavis.edu>

### Faculty

Javier Arsuaga, Ph.D., Professor  
(*Molecular and Cellular Biology*)

Eric Babson, Ph.D., Professor

Zhaojun Bai, Ph.D., Professor (*Computer Science*)

Craig Benham, Ph.D., Professor

Joseph Biello, Ph.D., Professor

James Bremer, Ph.D., Associate Professor

Angela Y. Cheer, Ph.D., Professor

Tudor Dimofte, Ph.D., Assistant Professor

Jesus De Loera, Ph.D., Professor

C. Albert Fannjiang, Ph.D., Professor

Roland Freund, Ph.D., Professor

Michael P. Friedlander, Ph.D., Professor

Eugene Gorsky, Ph.D., Assistant Professor

Janko Gravner, Ph.D., Professor

Niels Gronbech-Jensen, Ph.D., Professor  
(*Mechanical Engineering*)  
Robert Guy, Ph.D., Associate Professor  
Joel Hass, Ph.D., Professor  
John K. Hunter, Ph.D., Professor  
Adam J. Jacob, Ph.D., Assistant Professor  
Michael Kapovich, Ph.D., Professor  
Matthias Koeppe, Ph.D., Professor  
Gregory J. Kuperberg, Ph.D., Professor  
Timothy Lewis, Ph.D., Professor  
Fu Liu, Ph.D., Associate Professor  
Kevin Luli, Ph.D., Assistant Professor  
Ben Morris, Ph.D., Professor  
Motohico Mulase, Ph.D., Professor  
Academic Senate Distinguished Teaching Award  
Bruno L. Nachtergaele, Ph.D., Professor  
Brian Osserman, Ph.D., Professor  
E. Gerry Puckett, Ph.D., Professor  
Dan Romik, Ph.D., Associate Professor  
Naoki Saito, Ph.D., Professor  
Anne Schilling, Ph.D., Professor  
Jennifer Schultens, Ph.D., Professor  
Albert Schwarz, Ph.D., Professor  
Steve Shkoller, Ph.D., Professor  
Alexander Soshnikov, Ph.D., Professor  
Thomas Strohmer, Ph.D., Professor  
J. Blake Temple, Ph.D., Professor  
UC Davis Distinguished Professor 2012  
Becca Thomases, Ph.D., Associate Professor  
Abigail Thompson, Ph.D., Professor  
Academic Senate Distinguished Teaching Award  
Craig A. Tracy, Ph.D., Professor  
Monica Vazirani, Ph.D., Professor  
Mariel Vazquez, Ph.D., Professor  
(*Microbiology and Molecular Genetics*)  
Samuel Walcott, Ph.D., Associate Professor  
Andrew Waldron, Ph.D., Professor  
Qinglan Xia, Ph.D., Professor

### Emeriti Faculty

David Barnette, Ph.D., Professor Emeritus  
Donald C. Benson, Ph.D., Professor Emeritus  
Carlos R. Borges, Ph.D., Professor Emeritus  
Robert J. Buck, Professor Emeritus  
Gulbank D. Chakerian, Ph.D., Professor Emeritus  
Academic Senate Distinguished Teaching Award  
Doyle O. Cutler, Ph.D., Professor Emeritus  
James R. Diederich, Ph.D., Professor Emeritus  
Dmitry B. Fuchs, Ph.D., Professor Emeritus  
Robert D. Glauz, Ph.D., Professor Emeritus  
Kurt Kreith, Ph.D., Professor Emeritus  
Arthur J. Krener, Ph.D., Professor  
Melvin R. Krom, Ph.D., Professor Emeritus  
Gary J. Kurowski, Ph.D., Professor Emeritus  
David G. Mead, Ph.D., Professor Emeritus  
Academic Senate Distinguished Teaching Award  
E. O. Milton, Ph.D., Professor Emeritus  
Academic Senate Distinguished Teaching Award  
Alexander I. Mogilner, Ph.D., Professor Emeritus  
Donald A. Norton, Ph.D., Professor Emeritus  
Washek F. Pfeffer, Ph.D., Professor Emeritus  
G. Thomas Sallee, Ph.D., Professor  
Academic Senate Distinguished Teaching Award  
Sherman K. Stein, Litt.D. (Hon.), Ph.D., Professor Emeritus Academic Senate Distinguished Teaching Award  
Howard J. Weiner, Ph.D., Professor Emeritus  
Roger Wets, Ph.D., Professor Emeritus

### Affiliated Faculty

Ali Dad-del, Ph.D., Lecturer  
Academic Federation Excellence in Teaching Award  
Duane Kouba, Ph.D., Lecturer  
Lawrence Marx, Ph.D., Lecturer

### The Major Programs

Mathematics is the study of abstract structures, space, change, and the interrelations of these concepts. It also is the language of the exact sciences.

**The Program.** Students majoring in mathematics may follow a program leading to either the Bachelor of Arts or the Bachelor of Science degree. After completing basic introductory courses such as calculus and linear algebra, students plan an upper division

program in consultation with a faculty adviser. The upper division course offering is grouped into entry level, core, and enrichment courses. Entry level courses are designed to serve as a bridge between the concrete mathematics of the lower division and the more abstract concepts taught in upper division courses. The core classes are intended to provide basic mathematical techniques, whereas the enrichment choices allow students to further mathematical knowledge and skills that feature their research or career interests. This individualized program can lead to graduate study in pure or applied mathematics, elementary or secondary level teaching, or to other professional goals. It can also reflect a special interest such as computational and applied mathematics, computer science, or statistics, or may be combined with a major in some other field.

**Career Alternatives.** A degree in mathematics provides entry to many careers in addition to teaching. For instance, operations research, systems analysis, computing, actuarial work, insurance, and financial services are only a few such careers. Mathematics is also a sound basis for graduate work in a variety of fields, such as law, engineering, and economics.

### A.B. Major Requirements:

Preparatory Subject Matter .....	UNITS
Mathematics 12 (or high school equivalent) .....	0-3
Mathematics 21A, 21B, 21C, 21D, 22B, 25 .....	23
One of the following two options: (a) Mathematics 22A and 108 OR (b) Mathematics 67 .....	4-7
Computer Science 30 or Engineering 6 .... 4 Mathematics 22AL or equivalent MATLAB knowledge .....	0-1
Additional non-Mathematics courses chosen from natural sciences .....	12
NOTE: Basic knowledge of MATLAB is required for both Mathematics 67 and 22A. Students can learn it on their own, enroll in Engineering 6, Mechanical Engineering 5 or in the one unit course Mathematics 22AL (can be taken concurrently).	
<b>Depth Subject Matter .....</b>	<b>37-42</b>
A. Entry Level (Optional) .....	0-4
Suggested choice; one course from: Mathematics 108, 114, 115A, 141, 145	
B. Core .....	16
Mathematics 125A..... 4 Mathematics 125B..... 4 Mathematics 135A..... 4 Mathematics 150A..... 4	
C. Choose one Plan from the following two; up to 4 of these 18 units may be approved upper division courses outside of the Department of Mathematics with extensive use of mathematics .....	18
Plan 1: General Mathematics Additional upper division mathematics units selected in consultation with and subject to approval of an adviser .....	18
Plan 2: Secondary Teaching Mathematics 111 .....	4
Mathematics 115A..... 4 Mathematics 141 .....	4
Additional upper division mathematics units selected in consultation with and subject to approval of an adviser .....	6
NOTE: Students who wish to satisfy the single subject matter waiver for the teaching credential should see an adviser as early as possible.	
D. Capstone Course: Mathematics 189 or 192 (Internship in Applied Mathematics or 194 (Undergraduate Thesis) or 180 (Special Topics) or an approved substitute in consultation with the Undergraduate Vice Chair.....	3-4

Fall 2011 and on Revised General Education (GE): AH=Arts and Humanities; SE=Science and Engineering; SS=Social Sciences;

ACGH=American Cultures; DD=Domestic Diversity; OL=Oral Skills; QL=Quantitative; SL=Scientific; VL=Visual; WC=World Cultures; WE=Writing Experience

Pre-Fall 2011 General Education (GE): ArtHum=Arts and Humanities; SciEng=Science and Engineering; SocSci=Social Sciences; Div=Domestic Diversity; Wrt=Writing Experience

Quarter Offered: F=Fall, W=Winter, S=Spring, Su=Summer; 2017-2018 offering in parentheses

**Total Units for the Major ..... 80-92****Applied Mathematics****B.S. Major Requirements:**

UNITS

**Preparatory Subject Matter ..... 42-52**

Mathematics 12 (or high school equivalent).....	0-3
Mathematics 21A, 21B, 21C, 21D, 22B, 25 .....	23
One of the following two options: (a) Mathematics 22A and 108 OR (b) Mathematics 67 .....	4-7
Mathematics 22AL or equivalent basic knowledge of MATLAB .....	0-1
Computer Science 30, 40 .....	8
One two-quarter sequence from Physics 9A-9B; Biological Sciences 2A-2B; Chemistry 2A-2B; Economics 1A-1B; Statistics 32, 100; or other applied preparatory courses approved by your adviser .....	7-10

NOTE: Basic knowledge of MATLAB is required for both Mathematics 67 and 22A. Students can learn it on their own, enroll in Engineering 6, Mechanical Engineering 5 or in the one unit course Mathematics 22AL (can be taken concurrently).

**Depth Subject Matter ..... 51-56**

A. Entry Level (Optional) .....	0-4
Suggested choice; one course from: Mathematics 108, 114, 115A, 141, 145 .....	0-4
B. Core .....	32
Mathematics 150A.....	4
Mathematics 135A.....	4
Mathematics 125A.....	4
Mathematics 125B .....	4
Mathematics 119A.....	4
Mathematics 185A.....	4
Choose any two from the following: Mathematics 128A; 128B; 128C.....	8
C. Enrichment Courses .....	16
1. Choice of three courses from: Mathematics, between Mathematics 111 and Mathematics 185B (excluding Mathematics 180) worth at least four units each .....	12
2. One approved upper division course outside the Department of Mathematics with extensive use of mathematics .....	4
D. Capstone Course: Mathematics 189 or 192 (Internship in Applied Mathematics) or 194 (Undergraduate Thesis) or 180 (Special Topics) or an approved substitute in consultation with the Undergraduate Vice Chair .....	3-4

**Total Units for the Major ..... 93-108****Mathematics****B.S. Major Requirements:**

UNITS

**Preparatory Subject Matter ..... 34-42**

Mathematics 12 (or high school equivalent).....	0-3
Mathematics 21A, 21B, 21C, 21D, 22B, 25 .....	23
One of the following two options: (a) Mathematics 22A and 108, OR (b) Mathematics 67 .....	4-7
Computer Science 30 or Engineering 6.....	4
Physics 9A (Plans 1) or one course from: Physics 7A, 9A, Statistics 13, 32, 100 (Plan 2) .....	3-5

NOTE: Basic knowledge of MATLAB is required for both Mathematics 67 and 22A. Students can learn it on their own, enroll in Engineering 6, Mechanical Engineering 5 or in the one unit course Mathematics 22AL (can be taken concurrently).

**Depth Subject Matter ..... 51-56**

Choose one plan from the following two:

Plan 1: General Mathematics

A. Entry Level (Optional) .....	0-4
Suggested choices: one course from: Mathematics 108, 114, 115A, 141, 145 .....	0-4
B. Core .....	28
Mathematics 150A.....	4
Mathematics 150B .....	4
Mathematics 150C.....	4
Mathematics 135A.....	4
Mathematics 125A.....	4
Mathematics 125B .....	4
Mathematics 185A.....	4
C. Enrichment .....	20
Choice of five courses from Mathematics, between Mathematics 111 and Mathematics 185B (excluding Mathematics 180) worth at least four units each. Up to four units can be approved upper division units outside the Department of Mathematics with extensive use of mathematics.	
D. Capstone Course: Mathematics 189 or 192 (Internship in Applied Mathematics) or 194 (Undergraduate Thesis) or 180 (Special Topics) or an approved substitute in consultation with the Undergraduate Vice Chair .....	3-4

**Plan 2: Mathematics for Secondary Teaching**

A. Entry Level (Optional) .....	0-4
Suggested choice; one course from: Mathematics 108, 114, 145 .....	0-4
B. Core .....	28
Mathematics 150A.....	4
Mathematics 135A.....	4
Mathematics 125A.....	4
Mathematics 125B .....	4
Mathematics 111 .....	4
Mathematics 115A.....	4
Mathematics 141 .....	4
C. Enrichment .....	20
Choice of five courses from Mathematics, between Mathematics 111 and Mathematics 185B (excluding Mathematics 180) worth at least four units each. Up to four units can be approved upper division units outside the Department of Mathematics with extensive use of mathematics.	
D. Capstone Course: Mathematics 189 or 192 (Internship in Applied Mathematics) or 194 (Undergraduate Thesis) or 180 (Special Topics) or an approved substitute in consultation with the Undergraduate Vice Chair .....	3-4

**Total Units for the Major ..... 85-98****Mathematical Analytics and Operations Research****B.S. Major Requirements:****Preparatory Subject Matter ..... 43-50**

Mathematics 12 (or high school equivalent) .....	0-3
Mathematics 21A, 21B, 21C, 21D, 22B, 25 .....	23
One of the following two options: (a) Mathematics 22A and 108, OR (b) Mathematics 67 .....	4-7
Mathematics 22AL or equivalent basic knowledge of MATLAB .....	0-1
Computer Science 30 .....	4
Economics 1A, 1B .....	8
Statistics 32 or 100 .....	4

NOTE: Basic knowledge of MATLAB is required for both 22A and 67. Students can learn it on their own; enroll in Engineering 6, Mechanical Engineering 5, or in the one unit course Mathematics 22AL (can be taken concurrently).

**Depth Subject Matter ..... 51-55**

A. Entry Level (Optional) .....	0-4
Choices: 1 course from Mathematics 108, 114, 115A, 141, 145 .....	0-4
B. Core .....	28
Mathematics 150A.....	4
Mathematics 135A.....	4
Mathematics 125A.....	4
Mathematics 125B .....	4
Mathematics 128A.....	4
Mathematics 128B .....	4
Mathematics 128C .....	4
C. Enrichment .....	12
1. Choice of two courses from: Mathematics 118A, 118B, 118C, 119A, 119B, 129, 133, 167, 185A .....	8
2. Choice of one course from: Mathematics 111, 114, 115A, 116, 135B, 141, 145, 146, 147, 148, 150B, 165 .....	4
D. Choose one Emphasis from the following two: Computational and Mathematical Biology Emphasis	
Mathematics 124 .....	4
One approved upper division course in Biology .....	4
Computational and Mathematics Emphasis	
Mathematics 168 .....	4
One approved upper division course involving extensive computation or theory of computation .....	4
E. Capstone Course: Mathematics 189 or 192 (Internship in Applied Mathematics) or 194 (Undergraduate Thesis) or 180 (Special Topics) or an approved substitute in consultation with the Undergraduate Vice Chair .....	3-4

**Total Units for the Major ..... 86-98**

**Recommended Language Preparation.** Bachelor of Science degree candidates are advised, but not required, to satisfy the same language requirement as that for a Bachelor of Arts degree candidate, and to fulfill it in French, German, or Russian.

**Major Advisers.** For a current list of faculty and staff advisers, contact the Student Services office at [studentservices@math.ucdavis.edu](mailto:studentservices@math.ucdavis.edu), or see <https://www.math.ucdavis.edu/undergrad/advising/advisers/>.

**Depth Subject Matter Requirements.** Certain mathematically oriented courses given by other departments are admissible in partial satisfaction of the depth subject matter requirements with prior departmental approval. Up to three units of Mathematics 194 may be counted toward the depth subject matter requirements. Additionally, up to three units of Mathematics 198 or Mathematics 199, can be counted.

**Statement of Objectives.** As early as possible, but no later than the last quarter of the sophomore year or no later than the beginning of the first quarter of the junior year for transfer students, each prospective mathematics major, in consultation with a faculty adviser, should file a formal program of study in one of the majors offered in mathematics. Forms to be used for this are available on our website or from the Department office. Failure to file a formal program could lead to a delay in graduation.

**Information for Undergraduates.** Assistance in planning an undergraduate major program in mathematics is available on our website, as well as by consulting a faculty adviser. Information about the Department's faculty advisers can be found on our website.

**Mathematics Placement Requirement.** Students who wish to enroll in Mathematics 12, 16A, 17A, 21A, 21AH, and 36 must satisfy the mathematics placement requirement by taking an online exam. Students who do not satisfy the requirement will be administratively dropped from these courses. For more information, including preparation tips and how to access the online exam, please see the Department of Mathematics' website, at [http://www.math.ucdavis.edu/undergrad/math\\_placement](http://www.math.ucdavis.edu/undergrad/math_placement), well in advance of enrolling.

**Department Honors.** Students who have completed at least 135 units with a minimum GPA of 3.500 in courses counted towards their major will be considered for Department Honors.

Students who meet the minimum GPA requirement for honors at graduation for the College of Letters and Science and who complete a senior project as part of Math 194 or 199 units in consultation with their faculty adviser may also be recommended by the department for graduation with High Honors or Highest Honors. Recommendations will be based on evaluations of students' academic achievements in their major and the quality of their senior project. For complete details, see our website at <http://www.math.ucdavis.edu>.

## Minor Program Requirements:

UNITS

<b>Mathematics.....</b>	<b>20</b>
Upper division units in mathematics; exclusive of Mathematics 192, 197TC, 198, 199.....	20

## Teaching Credential Subject Representative.

Ali Dad-del

**Graduate Study.** The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in Mathematics. Information regarding graduate study may be obtained by consulting our website, and by sending an email to [studentservices@math.ucdavis.edu](mailto:studentservices@math.ucdavis.edu).

## Courses in Mathematics (MAT)

### Lower Division

#### B. Elementary Algebra (no credit)

Lecture—3 hours. Not open to Concurrent student enrollment. Basic concepts of algebra, including polynomials, factoring, equations, graphs, and inequalities. Offered only if sufficient number of students enroll. (P/NP grading only.)—F. (F.)

#### C. Trigonometry (no credit)

Lecture—2 hours. Not open to Concurrent student enrollment. Basic concepts of trigonometry, including trigonometric functions, identities, inverse functions, and applications. Offered only if sufficient number of students enroll. (P/NP grading only.)—F. (F.)

#### D. Intermediate Algebra (no credit)

Lecture—3 hours. Not open to Concurrent student enrollment. Basic concepts of algebra, prepares students for college work in mathematics, such as course 16A or 21A. Functions, equations, graphs, logarithms, and systems of equations. Offered only if sufficient number of students enroll. (P/NP grading only.)—F. (F. W.)

#### 12. Precalculus (3)

Lecture—3 hours. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry; and obtaining required score on the Precalculus Diagnostic Examination. Topics selected for their use in calculus, including functions and their graphs, slope, zeroes of polynomials, exponential, logarithmic and trigonometric functions, sketching surfaces and solids. Not open for credit to students who have completed any of courses 16A, 16B, 16C, 17A, 17B, 17C, 21A, 21B, or 21C with a C- or better. GE credit: SciEng | QL, SE, SL.—F, W, S. (F, W, S.)

**Note:** Mathematics 16A, 16B, and 16C are intended for students who will take no more Mathematics courses. Mathematics 17A, 17B, and 17C have the same level of rigor as 16A, 16B, and 16C, yet are much more broad mathematically (containing algebra, differential equations and probability, besides traditional calculus), and are intended for biology.

#### 16A. Short Calculus (3)

Lecture—3 hours. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry, and satisfying the Mathematics Placement Requirement. Limits; differentiation of algebraic functions; analytic geometry; applications, in particular to maxima and minima problems. Not open for credit to students who have completed course 17B, 17C, 21A, 21B, or 21C. Only 2 units of credit to students who have completed course 17A. GE credit: SciEng | QL, SE, SL.—F, W, S. (F, W, S.)

#### 16B. Short Calculus (3)

Lecture—3 hours. Prerequisite: course 16A, 17A, or 21A. Integration; calculus for trigonometric, exponential, and logarithmic functions; applications. Not open for credit to students who have completed courses 17C, 21B, or 21C. Only 2 units of credit to students who have completed course 17B. GE credit: SciEng | QL, SE, SL.—F, W, S. (F, W, S.)

#### 16C. Short Calculus (3)

Lecture—3 hours. Prerequisite: course 16B, 17B, or 21B. Differential equations; partial derivatives; double integrals; applications; series. Not open for credit to students who have completed course 21C. Only 2 units of credit to students who have completed course 17C. GE credit: SciEng | QL, SE, SL.—F, W, S. (F, W, S.)

**Note:** Mathematics 16A, 16B, and 16C are intended for students who will take no more Mathematics courses. Mathematics 17A, 17B, and 17C have the same level of rigor as 16A, 16B, and 16C, yet are much more broad mathematically (containing algebra, differential equations and probability, besides traditional calculus), and are intended for biology students.

#### 17A. Calculus for Biology and Medicine (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry, and analytical geometry, and satisfying the Mathematics Placement Requirement. Introduction to differential calculus via applications in biology and medicine. Limits, derivatives of polynomials, trigonometric, and exponential functions, graphing, applications of the derivative to biology and medicine. Not open for credit to students who have completed course 16B, 16C, 21A, 21B, or

21C; only 2 units of credit to students who have completed course 16A. GE credit: SciEng | QL, SE, SL.—F, W, S. (F, W, S.)

#### 17B. Calculus for Biology and Medicine (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 16A, 17A, or 21A. Introduction to integral calculus and elementary differential equations via applications to biology and medicine. Fundamental theorem of calculus, techniques of integration including integral tables and numerical methods, improper integrals, elementary first order differential equations, applications in biology and medicine. Not open for credit to students who have completed course 16C, 21B, or 21C. Only 2 units of credit for students who have completed course 16B. GE credit: SciEng | QL, SE, SL.—F, W, S. (F, W, S.)

#### 17C. Calculus for Biology and Medicine (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 17B with C- or above. Matrix algebra, functions of several variables, partial derivatives, systems of differential equations, and applications to biology and medicine. Not open for credit to students who have completed course 21C; only 2 units of credit to students who have completed course 16C. GE credit: SciEng | QL, SE, SL.—F, W, S. (F, W, S.)

#### 21A. Calculus (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry, and analytic geometry, and satisfying the Mathematics Placement Requirement. Functions, limits, continuity. Slope and derivative. Differentiation of algebraic and transcendental functions. Applications to motion, natural growth, graphing, extrema of a function. Differentials. L'Hopital's rule. Not open for credit to students who have completed course 16B, 16C, 17B, or 17C. Only 2 units of credit to students who have completed course 16A or 17A. GE credit: SciEng | QL, SE, SL.—F, W, S. (F, W, S.)

#### 21AH. Honors Calculus (4)

Lecture/discussion—4 hours. Prerequisite: a Precalculus Diagnostic Examination score significantly higher than the minimum for course 21A is required. More intensive treatment of material covered in course 21A. Offered irregularly. GE credit: SciEng | QL, SE.

#### 21AL. Emerging Scholars Program Calculus Workshop (2)

Workshop—6 hours. Prerequisite: concurrent enrollment in course 21A. Functions, limits, continuity. Slope and derivative. Same course content as course 21A. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.) Offered irregularly. GE credit: SE.

#### 21B. Calculus (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21A or 21AH. Continuation of course 21A. Definition of definite integral, fundamental theorem of calculus, techniques of integration. Application to area, volume, arc length, average of a function, improper integral, surface of revolution. Only 2 units of credit to students who have completed course 16B, 16C, 17B, or 17C. GE credit: SciEng | QL, SE, SL.—F, W, S. (F, W, S.)

#### 21BH. Honors Calculus (4)

Lecture/discussion—4 hours. Prerequisite: a grade of B or better in course 21A or 21AH. More intensive treatment of material covered in course 21B. Students completing 21BH can continue with course 21CH or the regular 21C. Offered irregularly. GE credit: SciEng | SE.

#### 21BL. Emerging Scholars Program Calculus Workshop (2)

Workshop—6 hours. Prerequisite: course 21A or 21AH; concurrent enrollment in 21B. Continuation of course 21A. Same course content as 21B. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. Offered irregularly. (P/NP grading only.) GE credit: SE.

**21C. Calculus (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 16C, 17C, 21B, or 21BH. Continuation of course 21B. Sequences, series, tests for convergence, Taylor expansions. Vector algebra, vector calculus, scalar and vector fields. Partial derivatives, total differentials. Applications to maximum and minimum problems in two or more variables. Applications to physical systems. GE credit: SciEng | QL, SE.—F, W, S. (F, W, S.)

**21CH. Honors Calculus (4)**

Lecture/discussion—4 hours. Prerequisite: a grade of B or better in course 21B or 21BH. More intensive treatment of material covered in course 21C. Offered infrequently. GE credit: SciEng | SE.

**21CL. Emerging Scholars Program Calculus Workshop (2)**

Workshop—6 hours. Prerequisite: concurrent enrollment in 21C. Continuation of course 21B. Same course content as course 21C. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.) Offered irregularly. GE credit: SE.

**21D. Vector Analysis (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C or 21CH. Continuation of course 21C. Definite integrals over plane and solid regions in various coordinate systems. Line and surface integrals. Green's theorem, Stoke's theorem, divergence theorem. GE credit: SciEng | QL, SE.—F, W, S. (F, W, S.)

**21M. Accelerated Calculus (5)**

Lecture/discussion—4 hours; discussion/laboratory—1 hour. Prerequisite: grade of B or higher in both semesters of high school calculus or a score of 4 or higher on the Advanced Placement Calculus AB exam, and obtaining the required score on the Precalculus Diagnostic Examination and its trigonometric component. Accelerated treatment of material from courses 21A and 21B, with detailed presentation of theory, definitions, and proofs, and treatment of computational aspects of calculus at a condensed but sophisticated level. Not open for credit to students who have completed course 21A or 21B; only 3 units of credit will be allowed to students who have completed course 16A and only 2 units of credit will be allowed to students who have completed course 16B. Offered irregularly. GE credit: SciEng | SE.

**22A. Linear Algebra (3)**

Lecture—3 hours. Prerequisite: nine units of college mathematics and Engineering 6 or knowledge of Matlab or course 22AL (to be taken concurrently). Matrices and linear transformations, determinants, eigenvalues, eigenvectors, diagonalization, factorization. Not open for credit to students who have completed course 67. GE credit: SciEng | QL, SE.—F, W, S. (F, W, S.)

**22AL. Linear Algebra Computer Laboratory (1)**

Laboratory—2-3 hours. Prerequisite: nine units of college mathematics. Introduction to Matlab and its use in linear algebra. (P/NP grading only.) GE credit: QL, SE.—F, W, S. (F, W, S.)

**22B. Differential Equations (3)**

Lecture—3 hours. Prerequisite: course 22A or 67 with C- or above. Solutions of elementary differential equations. GE credit: SciEng | QL, SE.—F, W, S. (F, W, S.)

**25. Advanced Calculus (4)**

Lecture/discussion—4 hours. Prerequisite: course 21C or 21CH. Introduction to the rigorous treatment of abstract mathematical analysis. Proofs in mathematics, induction, sets, cardinality; real number system, theory of convergence of sequences. Not open for credit to students who have completed former course 127A. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**36. Fundamentals of Mathematics (3)**

Lecture—3 hours. Prerequisite: satisfaction of the Mathematics Placement Requirement. Introduction to fundamental mathematical ideas selected from the principal areas of modern mathematics. Properties of the primes, the fundamental theorems of arithmetic,

tic, properties of the rationals and irrationals, binary and other number systems. Not open for credit to students who have completed course 108. Offered irregularly. GE credit: SciEng.

**67. Modern Linear Algebra (4)**

Lecture/discussion—4 hours. Prerequisite: course 21A or consent of instructor. Rigorous treatment of linear algebra; topics include vector spaces, bases and dimensions, orthogonal projections, eigenvalues and eigenvectors, similarity transformations, singular value decomposition and positive definiteness. Only one unit of credit to students who have completed course 22A. GE credit: SciEng | SE.—F, W. (F, W.)

**71A. Explorations in Elementary Mathematics (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: two years of high school mathematics. Weekly explorations of mathematical ideas related to the elementary school curriculum will be carried out by cooperative learning groups. Lectures will provide background and synthesize the results of group exploration. (Deferred grading only, pending completion of sequence.) Offered irregularly.

**71B. Explorations in Elementary Mathematics (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: two years of high school mathematics. Weekly explorations of mathematical ideas related to the elementary school curriculum will be carried out by cooperative learning groups. Lectures will provide background and synthesize the results of group exploration. (Deferred grading only, pending completion of sequence.) Offered irregularly.

**89. Elementary Problem Solving (1)**

Lecture—1 hour. Prerequisite: high school mathematics through precalculus. Solve and present solutions to challenging and interesting problems in elementary mathematics. May be repeated one time for credit. (P/NP grading only.) Offered irregularly.

**98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S. (F, W, S.)

**99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S. (F, W, S.)

**Upper Division****108. Introduction to Abstract Mathematics (4)**

Lecture/discussion—4 hours. Prerequisite: course 21B. A rigorous treatment of mathematical concepts with emphasis on developing the ability to understand abstract mathematical ideas, to read and write mathematical concepts, and to prove theorems. Designed to serve as preparation for the more rigorous upper division courses. GE credit: SciEng, Wrt | SE.—F, W, S. (F, W, S.)

**111. History of Mathematics (4)**

Lecture—3 hours; term paper or discussion. Prerequisite: eight units of upper division Mathematics; one of the following: course 25, 67, 108, 114, 115A, 141, or 145. History of mathematics from ancient times through the development of calculus. Mathematics from Arab, Hindu, Chinese and other cultures. Selected topics from the history of modern mathematics. GE credit: SciEng | SE.—W. (W.)

**114. Convex Geometry (4)**

Lecture/discussion—4 hours. Prerequisite: courses 21C, 22A or 67. Topics selected from the theory of convex bodies, convex functions, geometric inequalities, combinatorial geometry, and integral geometry. Designed to serve as preparation for the more rigorous upper-division courses. Offered in alternate years. GE credit: SciEng | SE.—(W.)

**115A. Number Theory (4)**

Lecture/discussion—4 hours. Prerequisite: course 21B. Divisibility and related topics, diophantine equations, selected topics from the theory of prime numbers. Designed to serve as preparation for the more rigorous upper division courses. GE credit: QL, SE.—F. (F.)

**115B. Number Theory (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 22A or 67; and 115A. Euler function, Moebius function, congruences, primitive roots, quadratic reciprocity law. Offered in alternate years. GE credit: SciEng | QL, SE, SL.—W.

**116. Differential Geometry (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 125A. Vector analysis, curves, and surfaces in three dimensions. Offered in alternate years. GE credit: SciEng | SE.—(S.)

**118A. Partial Differential Equations: Elementary Methods (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: courses 21D; 22B; 22A or 67. Derivation of partial differential equations; separation of variables; equilibrium solutions and Laplace's equation; Fourier series; method of characteristics for the one dimensional wave equation. Solution of nonhomogeneous equations. GE credit: SciEng | QL, SE.—F. (F.)

**118B. Partial Differential Equations: Eigenfunction Expansions (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 118A. Sturm-Liouville Theory; self-adjoint operators; mixed boundary conditions; partial differential equations in two and three dimensions; Eigenvalue problems in circular domains; nonhomogeneous problems and the method of eigenfunction expansions; Poisson's Equations. GE credit: SciEng | QL, SE.—W. (W.)

**118C. Partial Differential Equations: Green's Functions and Transforms (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 118B. Green's functions for one-dimensional problems and Poisson's equation; Fourier transforms; Green's Functions for time dependent problems; Laplace transform and solution of partial differential equations. Offered irregularly. GE credit: SciEng | QL, SE.

**119A. Ordinary Differential Equations (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: courses 21D; 22B; 22A or 67. Scalar and planar autonomous systems; nonlinear systems and linearization; existence and uniqueness of solutions; matrix solution of linear systems; phase plane analysis; stability analysis; bifurcation theory; Liapunov's method; limit cycles; Poincaré-Bendixson theory. GE credit: SciEng | QL, SE.—W. (W.)

**119B. Ordinary Differential Equations (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 119A. Lorentz equations; Poincaré maps; center manifolds and normal forms; scalar and planar maps; phase space analysis for iterated maps; period-doubling bifurcation; Lyapunov exponent; chaos and symbolic dynamics; strange attractors; fractals. GE credit: SciEng | QL, SE.—S. (S.)

**124. Mathematical Biology (4)**

Lecture—3 hours; project. Prerequisite: courses 22A or 67; 22B. Methods of mathematical modeling of biological systems including difference equations, ordinary differential equations, stochastic and dynamic programming models. Computer simulation methods applied to biological systems. Applications to population growth, cell biology, physiology, evolutionary ecology and protein clustering. MATLAB programming required. Offered in alternate years. GE credit: SciEng | QL, SE.—(S.)

**125A. Real Analysis (4)**

Lecture/discussion—4 hours. Prerequisite: course 25. Functions, limits of functions, continuity and uniform continuity, sequences of functions, series of real numbers, series of functions, power series. Not open for credit to students who have completed former course 127B. GE credit: SciEng | SE.—F, W, S. (F, S, W.)

**125B. Real Analysis (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 22A or 67; 125A. Theory of the derivative, Taylor series, integration, partial derivatives, Implicit Function Theorem. Not open for credit to students who have completed former course 127C. GE credit: SciEng | SE.—W, S. (W, S.)

**128A. Numerical Analysis (4)**

Lecture—3 hours; project. Prerequisite: course 21C; Computer Science Engineering 30. Error analysis, approximation, interpolation, numerical differentiation and integration. Programming in language such as Pascal, Fortran, or BASIC required. GE credit: SciEng | QL, SE.—F. (F.)

**128B. Numerical Analysis in Solution of Equations (4)**

Lecture—3 hours; project. Prerequisite: course 21C; 22A or 67; and Computer Science Engineering 30. Solution of nonlinear equations and nonlinear systems. Minimization of functions of several variables. Simultaneous linear equations. Eigenvalue problems. Linear programming. Programming in language such as Pascal, Fortran, or BASIC required. GE credit: SciEng | QL, SE.—W. (W.)

**128C. Numerical Analysis in Differential Equations (4)**

Lecture—3 hours; project. Prerequisite: course 22A or 67; 22B; and Computer Science Engineering 30. Difference equations, operators, numerical solutions of ordinary and partial differential equations. Programming in language such as Pascal, Fortran, or BASIC required. GE credit: SciEng | QL, SE.—S. (S.)

**129. Fourier Analysis (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 21D; 22A or 67; 22B; and 25. Fourier series and integrals, orthogonal sets of functions. Topics selected from trigonometric approximation, orthogonal polynomials, applications to signal and image processing, numerical analysis, and differential equations. GE credit: SciEng | QL, SE.—F. (F.)

**133. Mathematical Finance (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 67 or both 22A and 108; and 135A. Analysis and evaluation of deterministic and random cash flow streams, yield and pricing of basic financial instruments, interest rate theory, meanvariance portfolio theory, capital asset pricing models, utility functions and general principles. MATLAB programming required. Offered in alternate years. GE credit: SciEng | QL, SE, SL.—S.

**135A. Probability (4)**

Lecture/discussion—4 hours. Prerequisite: course 125A. Probability space; discrete probability, combinatorial analysis; independence, conditional probability; random variables, discrete and continuous distributions, probability mass function, joint and marginal density functions; expectation, moments, variance, Chebyshev inequality; sums of random variables, random walk, large number law, central limit theorem. Not open for credit to students who have completed former course 131. GE credit: SciEng | QL, SE.—F, W. (F, W.)

**135B. Stochastic Processes (4)**

Laboratory/discussion—4 hours. Prerequisite: courses 135A; 22A or 67. Generating functions, branching processes, characteristic function; Markov chains; convergence of random variables, law of iterated logarithm; random processes, Brownian motion, stationary processes, renewal processes, queueing theory, martingales. Not open for credit to students who have completed former course 132A. GE credit: SciEng | QL, SE.—S. (S.)

**141. Euclidean Geometry (4)**

Lecture/discussion—4 hours. Prerequisite: courses 21B; 22A or 67. An axiomatic and analytic examination of Euclidean geometry from an advanced point of view. In particular, a discussion of its relation to other geometries. Designed to serve as preparation for the more rigorous upper division courses. GE credit: SciEng | SE, VL.—W, S. (W, S.)

**145. Combinatorics (4)**

Lecture/discussion—4 hours. Prerequisite: course 21C. Combinatorial methods using basic graph theory, counting methods, generating functions, and recurrence relations. Designed to serve as preparation for the more rigorous upper division courses. GE credit: SciEng | QL, SE.—W, S. (W, S.)

**146. Algebraic Combinatorics (4)**

Lecture/discussion—4 hours. Prerequisite: courses 25; 22A or 67; 145. Enumeration, Polya theory, generating functions, current topics in algebraic combinatorics. Not open for credit to students who have completed former course 149A. GE credit: SciEng | SE.—S. (S.)

**147. Topology (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 25. Basic notions of point-set and combinatorial topology. GE credit: SciEng | SE.—F. (F.)

**148. Discrete Mathematics (4)**

Lecture/discussion—4 hours. Prerequisite: course 67; or 22A and 108. Coding theory, error correcting codes, finite fields and the algebraic concepts needed in their development. Not open for credit to students who have completed former course 149B. GE credit: SciEng | QL, SE.—W (W.)

**150A. Modern Algebra (4)**

Lecture/discussion—4 hours. Prerequisite: course 67; or 22A and 108. Basic concepts of groups, symmetries of the plane. Emphasis on the techniques used in the proof of the ideas (Lemmas, Theorems, etc.) developing these concepts. Precise thinking, proof writing, and the ability to deal with abstraction. GE credit: SciEng | SE.—F. (F.)

**150B. Modern Algebra (4)**

Lecture/discussion—4 hours. Prerequisite: course 150A. Bilinear forms, rings, factorization, modules. GE credit: SciEng | SE.—W. (W.)

**150C. Modern Algebra (4)**

Lecture/discussion—4 hours. Prerequisite: course 150B. Group representations, fields, Galois theory. GE credit: SciEng | SE.—S. (S.)

**160. Mathematical Foundations of Database Theory, Design and Performance (4)**

Lecture—3 hours; project. Prerequisite: course 22A or 67; one of the following courses: 25, 108, 114, 115A, 141, or 145. Relational model; relational algebra, relational calculus, normal forms, functional and multivalued dependencies. Separability. Cost benefit analysis of physical database design and reorganization. Performance via analytical modeling, simulation, and queueing theory. Block accesses; buffering; operating system contention; CPU intensive operations. Offered irregularly. GE credit: SciEng | QL, SE.—S. (S.)

**165. Mathematics and Computers (4)**

Lecture—3 hours; project. Prerequisite: course 22A or 67; and one of the following: 25, 108, 114, 115A, or 145. Introduction to computational mathematics, symbolic computation, and computer generated/verified proofs in algebra, analysis and geometry. Investigation of rigorous new mathematics developed in conjunction with modern computational questions and the role that computers play in mathematical conjecture and experimentation. GE credit: SciEng | QL, SE.—F. (F.)

**167. Applied Linear Algebra (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 22A or 67. Applications of linear algebra; LU and QR matrix factorizations, eigenvalue and singular value matrix decompositions. GE credit: SciEng | QL, SE.—F, S. (F, S.)

**168. Optimization (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 67 or both 22A and 108; and 21C. Linear programming, simplex method. Basic properties of unconstrained nonlinear problems, descent methods, conjugate direction method. Constrained minimization. Programming language required. GE credit: SciEng | QL, SE.—S. (S.)

**180. Special Topics (3)**

Lecture—3 hours. Prerequisite: course 67 or both 22A and 108; and 25. Special topics from various fields of modern, pure, and applied mathematics. Some recent topics include Knot Theory, General Relativity, and Fuzzy Sets. May be repeated for credit when topic differs. Offered irregularly. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**185A. Complex Analysis (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 67 or both 22A and 108; and 125A. Complex number system, analyticity and the Cauchy-Riemann equations, elementary functions, complex integration, power and Laurent series expansions, residue theory. GE credit: SciEng | SE.—W. (W.)

**185B. Complex Analysis (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 185A. Analytical functions, elementary functions and their mapping properties, applications of Cauchy's integral theorem, conformal mapping and applications to heat flow and fluid mechanics. Offered in alternate years. GE credit: SciEng | SE.—S.

**189. Advanced Problem Solving (3)**

Lecture—3 hours. Prerequisite: course 67 or both 22A and 108; and 25. Solution and presentation of advanced problem solving techniques. Solve and present interesting and challenging problems of all areas of mathematics. GE credit: SciEng, Wrt | OL, QL, SE, WE.—S. (S.)

**192. Internship in Applied Mathematics (1-3)**

Internship. Prerequisite: consent of instructor. Supervised work experience in applied mathematics. Final report. May be repeated for credit for a total of 10 units. (P/NP grading only.)—F, W, S. (F, W, S.)

**194. Undergraduate Thesis (3)**

Independent study. Prerequisite: consent of instructor. Independent research under supervision of a faculty member. Student will submit written report in thesis form. May be repeated with consent of Vice Chairperson. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

**197TC. Tutoring Mathematics in the Community (1-5)**

Seminar—1-2 hours; laboratory—2-6 hours. Prerequisite: consent of instructor. Special projects in mathematical education developing techniques for mathematics instruction and tutoring on an individual or small group basis. May be repeated one time for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

**198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S. (F, W, S.)

**199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

**Graduate****200A. Problem-Solving in Analysis (1)**

Lecture—1 hour; extensive problem solving. Prerequisite: courses 201ABC. Problem-solving in graduate analysis: continuous functions, metric spaces, Banach and Hilbert spaces, bounded linear operators, the spectral theorem, distributions, Fourier series and transforms, Lp spaces, Sobolev spaces. May be repeated two times for credit. (Deferred grading only, pending completion of sequence.)—S. (S.)

**200B. Problem-Solving in Analysis (1)**

Lecture—1 hour; extensive problem solving. Prerequisite: courses 201ABC. Problem-solving in graduate analysis: continuous functions, metric spaces, Banach and Hilbert spaces, bounded linear operators, the spectral theorem, distributions, Fourier series and transforms, Lp spaces, Sobolev spaces. May be repeated two times for credit. (Deferred grading only, pending completion of sequence.)—F. (F.)

**201A. Analysis (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: graduate standing in Mathematics or Applied Mathematics, or consent of instructor. Metric and normed spaces. Continuous functions. Topological, Hilbert, and Banach spaces. Fourier series. Spectrum of bounded and compact linear operators. Linear differential operators and Green's functions. Distributions. Fourier transform. Measure theory. Lp and Sobolev spaces. Differential calculus and variational methods.—F. (F.)

**201B. Analysis (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: graduate standing in Mathematics or Applied Mathematics, or consent of instructor. Metric and normed spaces. Continuous functions. Topological, Hilbert, and Banach spaces. Fourier series. Spectrum of bounded and compact linear operators. Linear differential operators and Green's functions. Distributions. Fourier transform. Measure theory. Lp and Sobolev spaces. Differential calculus and variational methods. —W. (W.)

**201C. Analysis (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: graduate standing in Mathematics or Applied Mathematics, or consent of instructor. Metric and normed spaces. Continuous functions. Topological, Hilbert, and Banach spaces. Fourier series. Spectrum of bounded and compact linear operators. Linear differential operators and Green's functions. Distributions. Fourier transform. Measure theory. Lp and Sobolev spaces. Differential calculus and variational methods. —S. (S.)

**202. Functional Analysis (4)**

Lecture—3 hours; term paper. Prerequisite: courses 201A and 201B. Hahn-Banach, Open mapping, Closed graph, Banach-Steinhaus, and Krein-Milman. Subspaces and quotient spaces. Projections. Weak and weak-star topologies. Compact and adjoint operators in Banach spaces. Fredholm theory. Functions of operators. Spectral theory of self-adjoint operators. Offered in alternate years. —W.

**205. Complex Analysis (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 185 or the equivalent, or consent of instructor. Analytic continuation, Riemann surfaces, conformal mappings, Riemann mapping theorem, entire functions, special functions, elliptic functions.

**205A. Complex Analysis (4)**

Lecture—3 hours; term paper or discussion—1 hour. Cauchy's theorem, Cauchy's integral formulas, meromorphic functions, complex logarithm, entire functions, Weierstrass infinite product formula, the gamma and zeta functions, and prime number theorem. —W. (W.)

**205B. Complex Analysis (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 205A or consent of instructor. Conformal mappings, the Schwarz lemma, analytic automorphisms, the Riemann mapping theorem, elliptic functions, Eisenstein series, the Jacobi theta functions, asymptotics, Bessel functions, the Airy function, topics on special functions and Riemann surfaces. May be repeated two times for credit if topic varies.—S. (S.)

**206. Measure Theory (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 125B. Introduction to measure theory. The study of lengths, surface areas, and volumes in general spaces, as related to integration theory. Offered in alternate years.—S.

**207A. Methods of Applied Mathematics (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Ordinary differential equations and dynamical systems. Variational principles. Eigenfunctions, integral equations and Green's functions. Complex analysis and contour integration. Laplace's equation. Diffusion equations. Wave phenomena. Dimensional analysis and scaling. Asymptotic expansions and perturbation theory. Stochastic processes and Brownian motion. —F. (F.)

**207B. Methods of Applied Mathematics (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Ordinary differential equations and dynamical systems. Variational principles. Eigenfunctions, integral equations and Green's functions. Complex analysis and contour integration. Laplace's equation. Diffusion equations. Wave phenomena. Dimensional analysis and scaling. Asymptotic expansions and perturbation theory. Stochastic processes and Brownian motion. —W. (W.)

**207C. Methods of Applied Mathematics (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Ordinary differential equations and dynamical systems. Variational principles. Eigenfunctions, integral equations and Green's functions. Complex analysis and contour integration. Laplace's equation. Diffusion equations. Wave phenomena. Dimensional analysis and scaling. Asymptotic expansions and perturbation theory. Stochastic processes and Brownian motion. —S. (S.)

**215A. Topology (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Fundamental group and covering space theory. Homology and cohomology. Manifolds and duality. CW complexes. Fixed point theorems. Offered in alternate years.—F.

**215B. Topology (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Fundamental group and covering space theory. Homology and cohomology. Manifolds and duality. CW complexes. Fixed point theorems. Offered in alternate years.—W.

**215C. Topology (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Fundamental group and covering space theory. Homology and cohomology. Manifolds and duality. CW complexes. Fixed point theorems. Offered in alternate years.—S.

**216. Geometric Topology (4)**

Lecture—3 hours; extensive problem solving—1 hour. Prerequisite: course 215A. Introduction to measure theory. Topology of two- and three-dimensional manifolds. Surfaces and their diffeomorphisms. Dehn twists. Heegaard surfaces. Theory of 3-dimensional manifolds. Knots and knot theory. Hyperbolic manifolds and geometric structures. May be repeated one time for credit. Offered in alternate years.—(S.)

**218A. Partial Differential Equations (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 201ABC or consent of instructor. A year-long sequence on PDEs which covers linear transport, Laplace, heat, and wave equations, maximum principles, method of characteristics, Sobolev and Hölder space theory, weak derivatives, semilinear, quasilinear, and fully nonlinear elliptic/parabolic equations, nonlinear hyperbolic equations, and compensated compactness. Offered in alternate years.—(F.)

**218B. Partial Differential Equations (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 218A or consent of instructor. A year-long sequence on PDEs which covers linear transport, Laplace, heat, and wave equations, maximum principles, method of characteristics, Sobolev and Hölder space theory, weak derivatives, semilinear, quasilinear, and fully nonlinear elliptic/parabolic equations, nonlinear hyperbolic equations, and compensated compactness. Offered in alternate years.—(W.)

**218C. Partial Differential Equations (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 218B or consent of instructor. A year-long sequence on PDEs which covers linear transport, Laplace, heat, and wave equations, maximum principles, method of characteristics, Sobolev and Hölder space theory, weak derivatives, semilinear, quasilinear, and fully nonlinear elliptic/parabolic equations, nonlinear hyperbolic equations, and compensated compactness. Offered in alternate years.—(S.)

**221A. Mathematical Fluid Dynamics (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 118B or consent of instructor. Kinematics and dynamics of fluids. The Euler and Navier-Stokes equations. Vorticity dynamics. Irrotational flow. Low Reynolds number flows and the Stokes equations. High Reynolds number flows and boundary layers. Compressible fluids. Shock waves. Offered in alternate years.—(F.)

**221B. Mathematical Fluid Dynamics (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 118B or consent of instructor. Kinematics and dynamics of fluids. The Euler and Navier-Stokes equations. Vorticity dynamics. Irrotational flow. Low Reynolds number flows and the Stokes equations. High Reynolds number flows and boundary layers. Compressible fluids. Shock waves. Offered irregularly.—(W.)

**226A. Numerical Methods: Fundamentals (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 128AB or equivalent, or consent of instructor; familiarity with some programming language. Fundamental principles and methods in numerical analysis, including the concepts of stability of algorithms and conditioning of numerical problems, numerical methods for interpolation and integration, eigenvalue problems, singular value decomposition and its applications. Offered in alternate years.—(F.)

**226B. Numerical Methods: Large-Scale Matrix Computations (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 167 or equivalent, or consent of instructor; familiarity with some programming language. Numerical methods for large-scale matrix computations, including direct and iterative methods for the solution of linear systems, the computation of eigenvalues and singular values, the solution of least-squares problems, matrix compression, methods for the solution of linear programs. Offered in alternate years.—(W.)

**226C. Numerical Methods: Ordinary Differential Equations (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 22B or equivalent, or consent of instructor; familiarity with some programming language. Numerical methods for the solution of ordinary differential equations, including methods for initial-value problems and two-point boundary-value problems, theory of and methods for differential algebraic equations, dimension reduction of large-scale dynamical systems. Offered in alternate years.—(S.)

**227. Mathematical Biology (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Nonlinear ordinary and partial differential equations and stochastic processes of cell and molecular biology. Scaling, qualitative, and numerical analysis of mathematical models. Applications to nerve impulse, chemotaxis, muscle contraction, and morphogenesis. Offered in alternate years.—F.

**228A. Numerical Solution of Differential Equations (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 128C. Numerical solutions of initial-value, eigenvalue and boundary-value problems for ordinary differential equations. Numerical solution of parabolic and hyperbolic partial differential equations. Offered in alternate years.—F.

**228B. Numerical Solution of Differential Equations (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 128C. Numerical solutions of initial-value, eigenvalue and boundary-value problems for ordinary differential equations. Numerical solution of parabolic and hyperbolic partial differential equations. Offered in alternate years.—W.

**228C. Numerical Solution of Differential Equations (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 128C. Numerical solutions of initial-value, eigenvalue and boundary-value problems for ordinary differential equations. Numerical solution of parabolic and hyperbolic partial differential equations. Offered in alternate years.—S.

**235A. Probability Theory (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: courses 125B and 135A or Statistics 131A or consent of instructor. Measure-theoretic foundations, abstract integration, independence,

laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from martingales, Markov chains, ergodic theory. (Same course as Statistics 235A.)—F. (F.)

### **235B. Probability Theory (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 235A/Statistics 235A or consent of instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from martingales, Markov chains, ergodic theory. (Same course as Statistics 235B.)—W. (W.)

### **235C. Probability Theory (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 235B/Statistics 235B or consent of instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from martingales, Markov chains, ergodic theory. (Same course as Statistics 235C.)—S. (S.)

### **236A. Stochastic Dynamics and Applications (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 201C or course/Statistics 235B; course/Statistics 235A-235B-235C recommended. Stochastic processes, Brownian motion, Stochastic integration, martingales, stochastic differential equations. Diffusions, connections with partial differential equations, mathematical finance. Offered in alternate years.—F.

### **236B. Stochastic Dynamics and Applications (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 201C or course/Statistics 235B; course/Statistics 235A-235B-235C recommended. Stochastic processes, Brownian motion, Stochastic integration, martingales, stochastic differential equations. Diffusions, connections with partial differential equations, mathematical finance. Offered irregularly.—S. (S.)

### **239. Differential Topology (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: vector calculus, point-set topology, course 201A, or consent of instructor; course 250AB highly recommended. Topics include: differentiable manifolds, vector fields, transversality, Sard's theorem, examples of differentiable manifolds; orientation, intersection theory, index of vector fields; differential forms, integration, Stokes' theorem, deRham cohomology; Morse functions, Morse lemma, index of critical points.—F. (F.)

### **240A. Differential Geometry (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 201A and 239; 250AB highly recommended; intended primarily for 2nd-year graduate students. Riemannian metrics, connections, geodesics, Gauss lemma, convex neighborhoods, curvature tensor, Ricci and scalar curvature, connections and curvature on vector bundles.—W. (W.)

### **240B. Differential Geometry (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 240A; intended primarily for 2nd-year graduate students. Jacobi fields, conjugate points, completeness, Hopf-Rinow theorem, Cartan-Hadamard theorem, energy, variation theorems and their applications, Rauch comparison theorem and its applications.—S. (S.)

### **245. Enumerative Combinatorics (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 145, 150 or the equivalent, or consent of instructor. Introduction to modern combinatorics and its applications. Emphasis on enumerative aspects of combinatorial theory. Offered in alternate years.—F.

### **246. Algebraic Combinatorics (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 245 or consent of instructor. Algebraic and geometric aspects of combinatorics. The use of structures such as groups, polytopes, rings, and simplicial complexes to solve combinatorial problems. Offered in alternate years—W.

### **248A. Algebraic Geometry (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: courses 250ABC. Affine varieties and radical ideals. Projective varieties. Abstract varieties. Morphisms and rational maps. Smoothness. Algebraic curves and the Riemann-Roch theorem. Special topics. Offered in alternate years.—(F.)

### **248B. Algebraic Geometry (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 248A. Complex varieties and the analytic topology. Sheaves and schemes. Fiber products. Separatedness and properness. Applications of scheme theory. Offered in alternate years.—(W.)

### **249A. Problem-Solving in Algebra (1)**

Lecture—1 hour; extensive problem solving. Prerequisite: courses 250A & B. Problem-solving in graduate algebra: groups, rings, modules, matrices, tensor products, representations, Galois theory, ring extensions, commutative algebra and homological algebra. May be repeated two times for credit. (Deferred grading only, pending completion of sequence.)—S. (S.)

### **249B. Problem-Solving in Algebra (2)**

Lecture—1 hour; extensive problem solving. Prerequisite: courses 250A & B. Problem-solving in graduate algebra: groups, rings, modules, matrices, tensor products, representations, Galois theory, ring extensions, commutative algebra and homological algebra. May be repeated two times for credit. (Deferred grading only, pending completion of sequence.)—F. (F.)

### **250A. Algebra (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: graduate standing in mathematics or consent of instructor. Group and rings. Sylow theorems, abelian groups, Jordan-Hölder theorem. Rings, unique factorization. Algebras, and modules. Fields and vector spaces over fields. Field extensions. Commutative rings. Representation theory and its applications.—F. (F.)

### **250B. Algebra (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: graduate standing in mathematics or consent of instructor. Group and rings. Sylow theorems, abelian groups, Jordan-Hölder theorem. Rings, unique factorization. Algebras, and modules. Fields and vector spaces over fields. Field extensions. Commutative rings. Representation theory and its applications.—W. (W.)

### **250C. Algebra (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: graduate standing in mathematics or consent of instructor. Group and rings. Sylow theorems, abelian groups, Jordan-Hölder theorem. Rings, unique factorization. Algebras, and modules. Fields and vector spaces over fields. Field extensions. Commutative rings. Representation theory and its applications.—S. (S.)

### **258A. Numerical Optimization (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: courses 25, 167. Numerical methods for infinite dimensional optimization problems. Newton and Quasi-Newton methods, linear and sequential quadratic programming, barrier methods; large-scale optimization; theory of approximations; infinite and semi-infinite programming; applications to optimal control, stochastic optimization and distributed systems. Offered in alternate years.—(F.)

### **258B. Discrete and Mixed-Integer Optimization (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 25 and 167, or consent of the instructor. Combinatorial, integer, and mixed-inte-

ger linear optimization problems. Ideal and strong formulations, cutting planes, branch and cut, decomposition methods. Offered in alternate years.—W.

### **261A. Lie Groups and Their Representations (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: courses 215A, 240A, 250A-250B or the equivalent or consent of instructor. Lie groups and Lie algebras. Classification of semi-simple Lie groups. Classical and compact Lie groups. Representations of Lie groups and Lie algebras. Root systems, weights, Weil character formula. Kac-Moody and Virasoro algebras. Applications. Offered in alternate years.—(W.)

### **261B. Lie Groups and Their Representations (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: courses 215A, 240A, 250A-250B or the equivalent or consent of instructor. Lie groups and Lie algebras. Classification of semi-simple Lie groups. Classical and compact Lie groups. Representations of Lie groups and Lie algebras. Root systems, weights, Weil character formula. Kac-Moody and Virasoro algebras. Applications. Offered irregularly.

### **265. Mathematical Quantum Mechanics (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 201 or consent of instructor. Mathematical foundations of quantum mechanics: the Hilbert space and Operator Algebra formulations; the Schrödinger and Heisenberg equations, symmetry in quantum mechanics, basics of spectral theory and perturbation theory. Applications to atoms and molecules. The Dirac equation. Offered in alternate years.—(F.)

### **266. Mathematical Statistical Mechanics and Quantum Field Theory (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 265 or consent of instructor. Mathematical principles of statistical mechanics and quantum field theory. Topics include classical and quantum lattice systems, variational principles, spontaneous symmetry breaking and phase transitions, second quantization and Fock space, and fundamentals of quantum field theory. May be repeated one time for credit. Offered in alternate years.—(W.)

### **271. Applied and Computational Harmonic Analysis (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: courses 125B or 201C; and 128B or 167; and 129 or equivalent, or consent of instructor. Introduction to mathematical basic building blocks (wavelets, local Fourier basis, and their relatives) useful for diverse fields (signal and image processing, numerical analysis, and statistics). Emphasis on the connection between the continuum and the discrete worlds. Offered in alternate years.—(W.)

### **280. Topics in Pure and Applied Mathematics (3)**

Lecture—3 hours. Prerequisite: graduate standing. Special topics in various fields of pure and applied mathematics. Topics selected based on the mutual interests of students and faculty. May be repeated for credit when topic differs.—F, W, S. (F, W, S.)

### **290. Seminar (1-6)**

Seminar—1-6 hours. Advanced study in various fields of mathematics, including analysis, applied mathematics, discrete mathematics, geometry, mathematical biology, mathematical physics, optimization, partial differential equations, probability, and topology. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

### **298. Group Study (1-5)**

F, W, S. (F, W, S.)

### **299. Individual Study (1-12)**

(S/U grading only.)—F, W, S. (F, W, S.)

### **299D. Dissertation Research (1-12)**

(S/U grading only.)—F, W, S. (F, W, S.)

**Professional****301A. Mathematics Teaching Practicum (3)**

Fieldwork—5 hours; discussion—1 hour. Prerequisite: course 302A and 303A required concurrently or consent of instructor. Specialist training in mathematics teaching. Teaching, training, and cross observing classes taught using large group Socratic techniques, small group guided inquiry experiences, and/or other approaches to teaching at various grade levels. Required for advanced degrees in mathematics education. May be repeated one time for credit. Offered irregularly.

**301B. Mathematics Teaching Practicum (3)**

Fieldwork—5 hours; discussion—1 hour. Prerequisite: course 302B and 303B required concurrently or consent of instructor. Specialist training in mathematics teaching. Teaching, training, and cross observing classes taught using large group Socratic techniques, small group guided inquiry experiences, and/or other approaches to teaching at various grade levels. Required for advanced degrees in mathematics education. May be repeated one time for credit. Offered irregularly.

**301C. Mathematics Teaching Practicum (3)**

Fieldwork—5 hours; discussion—1 hour. Prerequisite: course 302C and 303C required concurrently or consent of instructor. Specialist training in mathematics teaching. Teaching, training, and cross observing classes taught using large group Socratic techniques, small group guided inquiry experiences, and/or other approaches to teaching at various grade levels. Required for advanced degrees in mathematics education. May be repeated one time for credit. Offered irregularly.

**302A. Curriculum Development in Mathematics (1)**

Lecture/discussion—1 hour. Prerequisite: course 303A required concurrently or consent of instructor. Mathematics curriculum development for all grade levels. Required for advanced degrees in mathematics education. May be repeated one time for credit. Offered irregularly.

**302B. Curriculum Development in Mathematics (1)**

Lecture/discussion—1 hour. Prerequisite: course 303B required concurrently or consent of instructor. Mathematics curriculum development for all grade levels. Required for advanced degrees in mathematics education. May be repeated one time for credit. Offered irregularly.

**302C. Curriculum Development in Mathematics (1)**

Lecture/discussion—1 hour. Prerequisite: course 303C required concurrently or consent of instructor. Mathematics curriculum development for all grade levels. Required for advanced degrees in mathematics education. May be repeated one time for credit. Offered irregularly.

**303A. Mathematics Pedagogy (1)**

Lecture/discussion—1 hour. Prerequisite: course 302A or 210AL required concurrently or consent of instructor. An investigation of the interplay of mathematical pedagogy and mathematical content, including a historical survey of past and present methods in view of some of the influences that shaped their development. May be repeated one time for credit. Offered irregularly.

**303B. Mathematics Pedagogy (1)**

Lecture/discussion—1 hour. Prerequisite: course 302B or 210BL required concurrently or consent of instructor. An investigation of the interplay of mathematical pedagogy and mathematical content, including a historical survey of past and present methods in view of some of the influences that shaped their development. May be repeated one time for credit. Offered irregularly.

**303C. Mathematics Pedagogy (1)**

Lecture/discussion—1 hour. Prerequisite: course 302C or 210CL required concurrently or consent of instructor. An investigation of the interplay of mathematical pedagogy and mathematical content, including a historical survey of past and present methods

in view of some of the influences that shaped their development. May be repeated one time for credit. Offered irregularly.

**390. Teaching Assistantship Training (3)**

Lecture—3 hours. Prerequisite: graduate standing in the Department of Mathematics. Experience in methods of assisting and teaching of mathematics at the university level. Includes discussion of lecturing techniques, running discussion sessions, holding office hours, preparing and grading of examinations, student-teacher interaction, and related topics. Required of departmental teaching assistants. (S/U grading only.)—F. (F.)

**399. Individual Study (2-4)**

Independent study—2-3 hours; discussion—1 hour. Individual study of some aspect of mathematics education or a focused work on a curriculum design project under supervision of a faculty member in mathematics. May be repeated one time for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## Medical Informatics (A Graduate Group)

See [Health Informatics \(A Graduate Group\), on page 359](#).

## Medical Microbiology

See [Medicine, School of, on page 427](#).

## Medical Pharmacology and Toxicology

See [Medicine, School of, on page 427](#).

## Medicine

See [Medicine, School of, on page 427; and Medicine and Epidemiology \(VME\), on page 582](#).

## Medicine, School of

Julie Ann Freischlag, M.D.  
Vice Chancellor of Human Health Sciences Dean, School of Medicine

Thomas Nesbitt, M.D., M.P.H.  
Associate Vice Chancellor for Strategic Technologies and Alliances; Director, Center for Health and Technology

David Acosta, M.D.  
Associate Vice Chancellor for Equity, Diversity and Inclusion

Lars Berglund, M.D., Ph.D.  
Senior Associate Dean for Clinical Research

Edward Callahan, Ph.D.  
Associate Dean for Academic Personnel

Ralph de Vere White, M.D.  
Associate Dean for Cancer Center

David H. Wisner, M.D.  
Associate Dean for Clinical Affairs and Director, Practice Management Board

Mark Henderson, M.D.  
Associate Dean for Admissions and Outreach

Darin Latimore, M.D.

Associate Dean for Student and Resident Diversity

James Nuovo, M.D.

Associate Dean for Graduate Medical Education

Mark Servis, M.D.

Senior Associate Dean for Curriculum and Competency Development

School of Medicine Dean's Office  
Education Building  
4610 X Street

Sacramento, CA 95817

<http://www.ucdmc.ucdavis.edu/medschool/>

**Faculty**

To search for current faculty, see <http://www.ucdmc.ucdavis.edu/search/faculty/searchdetail.asp?searchtype=3>

**Admission Requirements and Professional Curriculum**

Detailed information can be obtained from the School of Medicine; see [School of Medicine](#), on page 137.

**Courses in the School of Medicine****Curriculum for the School of Medicine**

The curriculum for the M.D. degree at the UC Davis School of Medicine is a four-year program providing comprehensive preparation for graduate medical training (internships and residencies) and the practice of medicine. It offers a blend of basic science training and clinical experience with opportunities for research.

The first-year curriculum begins in August and extends into May and is organized into two blocks, Foundations and Mechanisms & Diseases. The basic science portion of the Foundations block includes courses in Molecular Biology, Cell and Tissue Biology, Gross Anatomy/Embryology/Radiology, and Human Physiology. The major organizing theme is structure-function along the continuum of hierarchical biologic structure from molecule to cell, tissue and major organ systems. The three year Doctoring curriculum begins with Doctoring 1, which is presented concurrently with the other courses. The focus of Doctoring 1 is physical examination training using standardized patients and models, correlated with concurrent gross anatomy and physiology by organ system. Behavioral medicine, epidemiology, biostatistics, cross-cultural medicine, and ethics are woven into the cases and didactic presentations and team-based learning modules. Students are required to attend preceptorships in the community and participate in home visits. Periodic quizzes and review sessions are used in the basic science courses throughout the block for formative assessment, and all courses administer comprehensive summative final examinations in December.

The Mechanisms & Disease block of the first-year curriculum begins in January and extends through April, with final exams in early May. There are two major threads, each of which is composed of several integrated courses. The Doctoring 1 course is offered concurrently. The Immunology/Microbiology/Pharmacology/Pathology thread presents an introduction to host defense, infection, basic pharmacologic principles, and general pathologic processes. The Endocrinology/Nutrition/Reproduction/Genetics (ENRG) thread covers essential concepts in genetics, basic and clinical nutrition, reproductive medicine, and clinical endocrinology. The general pathology course also includes male-female GU and endocrine pathology, and the pharmacology course covers antibiotics and endocrine pharmacology, with the goal of integration with concurrent courses. Periodic quizzes and review sessions provide formative feedback, and final examinations are used for summative assessment. The Doctoring 1 course continues with an emphasis on interviewing skills and clinical assessment. Cases are used in the problem-based learning approach for basic-science-clinical correlation, and for the exploration of psychosocial issues.

Preceptorships and home visits continue. The Doctoring 1 course concludes with a comprehensive final examination, and also includes an observed complete history and physical examination.

The first-year curriculum ends with a five week unscheduled block that may be used for vacation, remediation, electives, research, and international experiences.

The second-year curriculum is composed of two blocks- Brain & Behavior and Pathophysiology. Brain & Behavior begins in late June and extends through August with a neurosciences block composed of integrated neuroanatomy-clinical neurosciences. The latter emphasizes the pathophysiology of common neurological disorders. The systemic pathology curriculum continues with a focus on neuropathology, and the pharmacology course covers neuropharmacology. A clinical psychiatry course is also presented during this period. The Doctoring 2 course begins, focusing on advanced clinical skills and clinical reasoning using a combination of standardized patient assessments, problem-based learning, subspecialty physical examination sessions, preceptorships, and didactics in clinical epidemiology, medical economics, and socio-behavioral medicine. The Pathophysiology Block is devoted to compressed pathophysiology courses with tight integration of the systemic pathology and pharmacology courses. The courses are organized according to organ system (cardiovascular, pulmonary, renal, musculoskeletal system, hematology, gastroenterology, oncology, and dermatology). The Doctoring 2 curriculum continues concurrently with its focus on advanced clinical skills, epidemiology, ethics, and problem based assessment. History taking and physical diagnosis skills are correlated with the ongoing pathophysiology courses. Like the first year, all of the second year courses utilize periodic quizzes and review sessions and a comprehensive final examination. The Doctoring 2 course includes an objective structured clinical examination (OSCE) using standardized patients at the end of the course series.

The second-year curriculum ends in February and is followed by a six week, unscheduled block for preparation for USMLE Step 1, remediation, electives, and vacation.

The third-year program begins in April and includes six required clerkship rotations in the clinical specialties. Clerkships in surgery, internal medicine, obstetrics & gynecology, pediatrics, and psychiatry run for 8 weeks each. A four week family medicine clerkship and a four week selective are also required. In addition to the core clerkships, students will participate in a longitudinal primary care clinic throughout the third year. The third-year Doctoring program consists of longitudinal small groups led by faculty members who remain with their group throughout the year as the students rotate through their clerkships. Doctoring 3 themes include advanced interviewing techniques, clinical reasoning, clinical epidemiology, evidence-based medicine, and ethics/jurisprudence. Students must take a comprehensive clinical skills examination at the end of the third year which features self-assessment and faculty feedback.

The fourth-year curriculum features built-in flexibility to allow students to individualize their medical careers. The early start to the fourth year in May allows students to pursue electives for early exposure to clinical specialties or to complete clerkships which may have been deferred. All students are required to select a minimum of 32 weeks of clinical electives in addition to a single four-week special study module or scholarly project. The Special Study modules are designed to integrate basic sciences with clinical sciences, provide opportunities for students to practice and refine fundamental skills in critical appraisal and analysis of emerging scientific developments, and to allow students to focus in-depth on a multidisciplinary topic of special interest to the student. The Scholarly Project requires independent inquiry with faculty mentorship and leads to a publishable manuscript and student presentation of the project at a research forum held in the winter.

Individual student programs are designed under the guidance of college directors, mentors and faculty advisers, with the support of the Career Advising Office. Each student's fourth-year program must be approved by the Fourth Year Oversight Committee to ensure appropriate breadth, depth, and vigor. There are strict guidelines for the choices and time allowed away from the home institution. To satisfy the M.D. degree program, the student must successfully complete the required course work, clerkships, and fourth year requirements. Students must pass USMLE Step 1, USMLE Step 2 CS and CK, and complete the fourth year clinical performance examination. In addition to the fourth-year elective program available, there is the opportunity for students to select from a variety of electives during the first two years. Examples include electives in history of ethics and medicine, medical Spanish and insights in clinical research. Most students also participate in one of several student-run, community clinics for elective credit during their first and second years.

## Coordination with other Advanced Degree Programs

The curriculum for the M.D. degree provides flexibility and encourages coordination with other advanced degree programs (Ph.D., M.S., M.A., M.B.A., and M.P.H.). These programs offer a wide breadth of study areas and draw upon the considerable expertise of the entire campus faculty. The Department of Public Health Sciences offers an M.P.H. program in conjunction with the M.D. program. This program is designed for students interested in disease prevention and community health, health professionals and State Health Department employees.

School of Medicine administrators enthusiastically support students interested in pursuing advanced degree programs. The dual-degree program for the M.D./Ph.D. is targeted to train physicians to meet, respond to and solve the broad diversity of problems and dilemmas facing current and future health care. Students are encouraged to seek degrees in any of the campus wide Ph.D. programs, including those in social sciences and humanities. The UC Davis School of Medicine awards competitive fellowships each year to students enrolled in the M.D./Ph.D. program.

## Required Curriculum for the M.D. Degree

The following listing is the typical sequencing of all courses required for earning the M.D. degree. Course descriptions are given under the individual departmental course offerings.

### First-Year Required Courses

#### Year 1, Foundations Block

Molecular Medicine, BCM 410A  
Gross-Radiologic-Developmental Anatomy, CHA 400  
Human Physiology, HPH 400  
Human Microscopic Anatomy, CHA 402  
Doctoring 1, MDS 411A

#### Year 1, Mechanisms & Disease Block

Medical Immunology, MMI 480A  
Medical Microbiology, MMI 480B  
General and Endocrine Pathology, PMD 410A  
Pharmacology, PHA 400A  
Endocrine-Nutrition-Reproduction-Genetics, "ENRG", MDS 406  
Doctoring 1, MDS 411B

### Second-Year Required Courses

#### Year 2, Brain & Behavior Block

Neuroanatomy, CHA 403  
Systemic Pathology, PMD 410B  
Pharmacology, PHA 400B  
Clinical Neurosciences, NEU 420  
Foundations of Bioethics, MDS 428  
Fundamentals of Clinical Psychiatry, PSY 403  
Doctoring 2, MDS 421A

### Year 2, Pathophysiology Block

Integumentary System, DER 420  
Cardiovascular System, IMD 420D  
Pulmonary and Critical Care, IMD 420C  
Nephrology, IMD 420E  
Hematology, IMD 420A  
Systemic Pathology, PMD 410C/D  
Pharmacology, PHA 400C  
Oncology, HON 420  
GI System, IMD 420B  
Doctoring 2, MDS 421B/C

### Third- and Fourth-Year Required Courses

#### Transition to Clerkships - MDS 429

#### Required Third-Year

Internal Medicine  
Clerkship—IMD 430 ..... 8 weeks  
Surgery  
Clerkship—SUR 430 ..... 8 weeks  
Pediatrics  
Clerkship—PED 430 ..... 8 weeks  
Family Medicine Clerkship—  
FAP 430 ..... 4 weeks  
Obstetrics and Gynecology  
Clerkship—OBG 430 ..... 8 weeks  
Psychiatry  
Clerkship—PSY 430 ..... 8 weeks  
Doctoring 3, MDS 430A-D

#### Fourth-Year Requirements

36 Weeks of Required Course work comprised of the following specifics:

- 4 weeks of an Inpatient Acting Internship from one of the following departments at UC Davis: Internal Medicine, OB-GYN, Pediatrics, Surgery, Family & Community Medicine and Psychiatry
- 4 weeks of Inpatient or Ambulatory Acting Internship in any department/discipline
- 4 weeks of Special Studies Module or Scholarly Project
- 4 weeks of Emergency Medicine
- 20 weeks of additional Acting Internships, Advanced Clinical Clerkships or Clinical Didactics
- 16 weeks must be taken at UC Davis
- 28 weeks must be in direct patient care

### Medical Sciences (MDS)

#### Lower Division

##### 99. Special Study in Medicine for Undergraduates (1-5)

Independent study—3-15 hours. Prerequisite: consent of instructor. Participate in research projects relating to medicine with faculty in the School of Medicine. (S/U grading only.)—F, W, S, Su. (F, W, S, Su.)

#### Upper Division

##### 192. Medical Education Internship for Advanced Undergraduates (1-12)

Internship—3-36 hours. Prerequisite: competency with computers. Enrollment dependent on availability of intern positions. Participate in projects related to curriculum development in support of curriculum for M.D. degree. Gain work experience and appreciation for innovative approaches to learning in basic and clinical sciences of medical education. May be repeated for credit for up to 12 units. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

#### Professional

##### 401. Applications of Computers to Medical Practice (2)

Autotutorial—2 hours. Prerequisite: enrollment in medical school. Proficiency in computer applications relative to practice of medicine, with emphasis on email, literature searching, file transfer, and hospital information services. Course given online, at home or in lab; time and place determined by student. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Huntley

**402. Clinical & Cultural Spanish (2)**

Lecture—1 hour; practice—1 hour; independent study—4 hours. Prerequisite: consent of instructor. Medical students, nursing students and physician assistants students who are fluent Spanish speakers will learn a comprehensive set of medical vocabulary and cultural aspects related to the treatment of Spanish speaking patients. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Odor

**403. Science & Practice of Mindfulness and Compassion (1)**

Lecture/discussion—10 hours; independent study—20 hours. Prerequisite: consent of instructor. Restricted to Medical school students. Course will examine current scientific evidence for the effects of different mindfulness and compassion meditation practices in both healthy and clinical samples. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Goldin, Sitteri

**406. Endocrinology, Nutrition, Reproduction and Genetics (9.5)**

Lecture—3.8 hours; discussion/laboratory—2.8 hours. Prerequisite: Biological Chemistry 410A; Human Physiology 400. Restricted to Medical students only. Basic and pathophysiologic processes involved in human reproductive and endocrine control systems, nutritional regulation, and foundational genetics across the lifespan. Integrate information across these systems and use clinical reasoning process to identify and understand relevant perturbations and diseases. May be repeated three times for credit. (P/F grading only; deferred grading only, pending completion of sequence.)—W. (W.) Hagiwara, Hou, Prescott, Sheely

**411A. Doctoring 1 (4)**

Discussion—1 hour; clinical activity—1 hour; lecture/discussion—1 hour. Prerequisite: approval of committee on student progress. Medical students only. Small, case-based learning groups with training in patient communication and interviewing techniques, clinical identification and problem solving, applications of social, psychological, cultural, bioethical, and basic science concepts to patient case scenarios, outpatient clinical experiences and didactic presentations. (P/F grading only; deferred grading only, pending completion of sequence.)—F, S. (F, S.) Eidson-Ton, Henderson, Onate

**411B. Doctoring 1 (5)**

Discussion—1.5 hours; clinical activity—1.5 hours; lecture/discussion—1.8 hours. Medical students only. Small, case-based learning groups with training in patient communication and interviewing techniques, clinical identification and problem solving, applications of social, psychological, cultural, bioethical, and basic science concepts to patient case scenarios, outpatient clinical experiences and didactic presentation. (P/F grading only; deferred grading only, pending completion of sequence.)—F, S. (F, S.) Eidson-Ton, Henderson, Onate

**411KA. ACE-PC Program Doctoring 1 (8)**

Clinical Activity—5 hours; lecture/discussion—6 hours. Prerequisite: consent of instructor. Small case-based learning groups with training in patient communication and interviewing techniques clinical identification and problem solving applications of social psychological cultural bioethical and basic science concepts to patient case scenarios outpatient clinical experiences and didactic presentations. (P/F grading only; deferred grading only, pending completion of sequence.)—F, Su. (F, Su.) Eidson-Ton, Han, Henderson

**411KB. ACE-PC Program Doctoring 1 (5)**

Clinical Activity—4 hours; discussion—1 hour. Prerequisite: consent of instructor. Application of multidisciplinary basic, social and clinical science to clinical cases in small groups. History, physical examination with preceptors. Didactics in epidemiology, ethics, sexuality and clinical reasoning. Evaluation of professional competencies, attitudes and skills needed in the practice of medicine. (P/F grading only; deferred grading only, pending completion of sequence.)—F, S. (F, S.) Henderson, Lee, Sciola

**420. Multisystem Clinical Presentations (5)**

Extensive problem solving—15 hours; independent study—6 hours. Prerequisite: completion of Pathophysiology Block; consent of instructor. Capstone course integrates coursework, knowledge, skills and experiential learning to enable the student to demonstrate a broad mastery of learning across the curriculum. (P/F grading only.)—S. (S.) Venugopal

**421A. Doctoring 2 (6)**

Discussion—1 hour; lecture/discussion—1 hour; internship—0.5 hours. Prerequisite: approval by the School of Medicine Committee on Student Progress; medical students only. Application of multidisciplinary basic, social and clinical science to clinical cases in small groups. History, physical examination with preceptors. Didactics in epidemiology, ethics, sexuality and clinical reasoning. Evaluation of professional competencies, attitudes and skills needed in the practice of medicine. (Deferred grading only, pending completion of sequence. P/F grading only.)—Su. (Su.) Lee, Molla, Sciola

**421B. Doctoring 2 (6)**

Discussion—1 hour; lecture/discussion—1 hour; internship—0.5 hours. Prerequisite: approval by the School of Medicine Committee on Student Progress; medical students only. Application of multidisciplinary basic, social & clinical science concepts to cases in small groups. History, physical examination with preceptors. Didactics in epidemiology, ethics, sexuality, and clinical reasoning. Evaluation of professional competencies, attitudes and skills needed in the practice of medicine. (Deferred grading only, pending completion of sequence. P/F grading only.)—F. (F.) Lee, Molla, Sciola

**421C. Doctoring 2 (6)**

Discussion—1 hour; lecture/discussion—1 hour; internship—0.5 hours. Prerequisite: approval by the School of Medicine Committee on Student Progress; medical students only. Application of multidisciplinary basic, social and clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (P/F grading only.)—W. (W.) Lee, Molla, Sciola

**421KA. ACE-PC Program Doctoring 2 (6)**

Discussion—1 hour; lecture/discussion—1 hour; internship—0.5 hours. Prerequisite: admission into ACE-PC and successful completion of MDS 411KA & MDS 411KB. MDS 421KA-C are a year-long series of courses. Objectives and assessments have been accelerated to accommodate the students enrolled in the ACE-PC Program. Students will participate in all aspects of Doctoring 2, other than what was done in 411KA/KB. (P/F grading only; deferred grading only, pending completion of sequence.)—Su. (Su.) Henderson, Sciola, Williams

**421KB. ACE-PC Program Doctoring 2 (6)**

Discussion—1 hour; lecture/discussion—1 hour; internship—0.5 hours. Prerequisite: approval by the School of Medicine on Student Progress; medical students only. MDS 421KA-C are a year-long series of courses. Objectives and assessments have been accelerated to accommodate the students enrolled in the ACE-PC Program. Students will participate in all aspects of Doctoring 2, other than what was done in 411KA/KB. (P/F grading only; deferred grading only, pending completion of sequence.)—F. (F.) Henderson, Sciola, Williams

**421KC. ACE-PC Program Doctoring 2 (6)**

Discussion—1 hour; lecture/discussion—1 hour; internship—0.5 hours. Prerequisite: approval by the School of Medicine on Student Progress; medical students only. MDS 421KA-C are a year-long series of courses. Objectives and assessments have been accelerated to accommodate the students enrolled in the ACE-PC Program. Students will participate in all aspects of Doctoring 2, other than what was done in 411KA/KB. (P/F grading only; deferred grading only, pending completion of sequence.)—W. (W.) Henderson, Sciola, Williams

**428. Foundations of Bioethics (1)**

Discussion—3 sessions; lecture/discussion—3 sessions; independent study—16.5 sessions; web virtual lecture—1 session. Prerequisite: consent of instructor. Course will expose students to core content in bioethics and the law and introduce a framework for ethical decision-making, while emphasizing relationships between bioethics and clinical care. (P/F grading only.)—Su. (Su.) Fairman, Rich

**429. Transition to Clerkships (1)**

Laboratory/discussion—12 hours; workshop—13 hours; discussion—7 hours; independent study—2 hours. Incoming third-year medical students will participate in a variety of educational experiences designed to prepare them to begin their clerkship curriculum. Course content will be disseminated in large and small group settings. (P/F grading only.)—S. (S.) Bing, Venugopal

**430. Introduction to Doctoring 3 (1)**

Discussion—2 hours. Prerequisite: approval by SOM Committee on Student Progress. Restricted to Medical students only. Introductory course for the Doctoring 3 Program. All students enrolling in Medical Sciences 430 A-D should complete this course prior to beginning their work in Doctoring 3. (H/P/F grading only.)—S. (S.) Wilkes

**430A. Doctoring 3 (1)**

Discussion—3 hours. Prerequisite: approval by School of Medicine Committee on Student Progress. Restricted to Medical students only. Application of multidisciplinary basic, social and clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (H/P/F grading only; deferred grading only, pending completion of sequence.)—Su. (Su.) Wilkes

**430B. Doctoring 3 (1)**

Discussion—2 hours. Prerequisite: approval by SOM Committee on Student Progress. Restricted to Medical students only. Application of multidisciplinary basic, social & clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (H/P/F grading only; deferred grading only, pending completion of sequence.)—F. (F.) Wilkes

**430C. Doctoring 3 (1)**

Discussion—2 hours. Prerequisite: approval by SOM Committee on Student Progress. Restricted to Medical students only. Application of multidisciplinary basic, social & clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (H/P/F grading only; deferred grading only, pending completion of sequence.)—W. (W.) Wilkes

**430D. Doctoring 3 (1)**

Discussion—2 hours. Prerequisite: approval by SOM Committee on Student Progress. Restricted to Medical students only. Application of multidisciplinary basic, social & clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (H/P/F grading only; deferred grading only, pending completion of sequence.)—S. (S.) Wilkes

**435KA. ACE-PC Longitudinal Integrated Clerkship A (18)**

Clinical activity—45 hours; independent study—6 hours; discussion—4 hours. Prerequisite: consent of instructor. Longitudinal Clerkship will combine the Internal Medicine, OB/GYN, Pediatrics, Psychiatry and Surgery Clerkships for the ACE-PC Program. (H/P/F grading only; deferred grading only, pending completion of sequence.)—S. (S.) Holt, Zachary

**435KB. ACE-PC Longitudinal Integrated Clerkship B (21)**

Clinical activity—45 hours; independent study—6 hours; discussion—4 hours. Prerequisite: consent of instructor. Longitudinal Clerkship will combine the Internal Medicine, OBGYN, Pediatrics, Psychiatry and Surgery Clerkships for the ACE-PC Program. (H/P/F grading only; deferred grading only, pending completion of sequence.)—Su. (Su.) Holt, Zachary

**435KC. ACE-PC Longitudinal Integrated Clerkship C (18)**

Clinical activity—45 hours; independent study—6 hours; discussion—4 hours. Prerequisite: consent of instructor. Longitudinal Clerkship will combine the Internal Medicine, OBGYN, Pediatrics, Psychiatry and Surgery Clerkships for the ACE-PC Program. (H/P/F grading only; deferred grading only, pending completion of sequence.)—F. (F.) Holt, Zachary

**440. Doctoring 4 Teaching Fellowship (3)**

Discussion—5 hours; seminar—0.25 hours. Prerequisite: course 430A, 430B, 430C, 430D; consent of instructor. Restricted to Medical student only. Instruction on teaching methodology and pedagogy. Mentored teaching of junior medical students in seminar, lecture, and bedside. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Wilkes

**441. Combined Ophthalmology and Otolaryngology Clerkship (6)**

Clinical activity—4 weeks. Prerequisite: approval by Committee on Student Promotion and Evaluation. Fundamental knowledge of ophthalmology and otolaryngology for the treatment of eye, ear, nose and throat problems at a level of training of general physicians, including when to refer patients to a specialist. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Brandt, Strong

**450. Introduction to UC Davis Medical Center (1)**

Seminar—20 hours total. Prerequisite: second-year medical student. Designed to assist medical student in transition from classroom to hospital setting. (H/P/F grading only.)—S. (S.)

**455. Student Run Clinics (1-3)**

Clinical Activity—3.9 hours. Open to medical students in good standing. Will learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of physician. Meet all requirements and prerequisites of the particular clinic within which they work. May be repeated for credit. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Latimore, Servis

**460CR. Introduction to Clinical Research (2)**

Lecture—2 hours; independent study—3 hours. Restricted to completion of M.D., D.D.S., D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program. Introduction to the CRGG program and overview of major clinical research topics. Overview of basic clinical skills needed to accomplish CRGG mentored research project. (P/F grading only.)—Su. (Su.) Frederick

**461CR. Strategies for Grant Writing (2)**

Lecture/discussion—2 hours. Restricted to completion of M.D., D.D.S., D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program. Practical skills and strategies to create successful grant proposals in the NIH style and format. Generating ideas, identifying and accessing research resources, grant components, specific aims, background and significance, preliminary studies, budgets, and bios. Matriculation through UC system, and resubmissions. (S/U grading only.)—Su. (Su.) Rutledge

**462CR. Introduction to Clinical Epidemiology and Study Design (3)**

Lecture—25 hours; discussion—10 hours. Restricted to completion of M.D., D.D.S., D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program. Anatomy

and physiology of conducting clinical epidemiologic research. Familiarity with three basic study designs (cross-sectional, case-control, and cohort). Discussion of principles of measurements in clinical epidemiological studies, basic methods for analyzing data, and ethical issues involved in conducting research. (S/U grading only.)—Su. (Su.) McCurdy, Romano

**463CR. Methods in Clinical Research (5)**

Lecture—3 hours; discussion—2 hours. Restricted to completion of M.D., D.D.S., D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program. Overview of major approaches to clinical research, including health services research techniques, informatics, the GCRC, and preclinical methodologies to enhance clinical projects. Overview of UC Davis clinical research support infrastructure. Methodologies applicable to clinical research and its multi-disciplinary perspective. (S/U grading only.)—Su. (Su.) Berglund, Lloyd, Kravitz

**464CR. Responsible Conduct of Research (3)**

Lecture—3 hours. Restricted to completion of M.D., D.D.S., D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program. The nine NIH-mandated modules: Data Acquisition and Reporting, Mentor Training, Publication Practices and Authorship, Peer Review/Grant Process, Collaborative Science, Human Subjects, Research with Animals, Conflict of Interest, Research Misconduct, and Entrepreneurship/Industry Collaborations/Intellectual Property/Technology Transfer. (S/U grading only.)—Su. (Su.) Wun

**465CR. Introduction to Medical Statistics (4)**

Lecture—3 hours; laboratory—2 hours. Restricted to completion of M.D., D.D.S., D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program. Biomedical applications of statistical methods in clinical, laboratory and population medicine. Graphical/tabular data presentation, probability, binomial, Poisson, normal, t-, F-, and Chi-square distributions, elementary nonparametric methods, simple linear regression/correlation, life tables. Microcomputer applications of statistical procedures in population medicine. (S/U grading only.)—Su. (Su.) Becket, Wegelin

**468C. International Clinical Preceptorship (1-12)**

Clinical activity—30 hours. Prerequisite: medical students with consent of instructor. Multidisciplinary preceptorship in a foreign country. Clinical credit will be awarded using this course, once approval has been received from the appropriate governing committee. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**468D. International Elective (1-12)**

Independent study—20 hours; clinical activity—10 hours. Prerequisite: medical students with consent of instructor. Multidisciplinary preceptorship in a foreign country. Course used to award non-clinical credit for international experiences which have been approved by the appropriate governing committee. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**470. Introduction to Dentistry (3-18)**

Clinical activity—34 hours; lecture—6 hours. Prerequisite: fourth-year medical student in good standing; consent of instructor. Introduction to Dentistry and basic Oral and Maxillofacial Surgery. Course is offered by the Oral and Maxillofacial Surgery department at UC San Francisco. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Pogrel, Wallach

**480. Insights in Clinical Research (1)**

Lecture—1 hour. Prerequisite: medical student in good standing. Seminars on research presented by Medical School faculty; overview of pertinent issues, including medical ethics, human subjects protocols, case control methods, etc. (P/F grading only.)—S. (S.)

**481. Insights into Clinical Specialties (1)**

Lecture/discussion—1 hour. Prerequisite: medical student in good standing. Exposure to various medical specialties, their residency programs and ways in which medical students can prepare for and improve their candidacy for such programs. (H/P/F grading only.)—Su. (Su.)

**482. Lecture Series in Reproductive Health (1)**

Lecture—1 hour. Psychosocial and public health aspects of providing quality reproductive health care and application in student-run free clinics and in 3rd year clerkships. Only medical students may enroll for credit; undergraduates may audit the course. May be repeated two times for credit. (P/F grading only.)—W. (W.) Paik

**483. Insights in Political, Legal and Business Aspects of Medicine (1)**

Lecture—1 hour. Prerequisite: Medical student in good standing. Restricted to Medical student only. The practical aspects of a medical career. May be repeated two times for credit. (P/F grading only.)—S. (S.)

**485. Health Policy Lecture Series (1)**

Lecture—1 hour. Lecture series provides an overview of local, state, national and international health policy. The current challenges health care reform implementation is facing provides how medical students can successfully advocate for changes in health policy. May be repeated for credit. (P/F grading only.)—F. (F.) Romano

**486. Topics in Health Care Improvement (0.5)**

Lecture/discussion—15 sessions. Lecture series will cover major topics in health care improvement, presented by guest speakers who are leaders in the field. May be repeated for credit. (P/F grading only.)—S. (S.) Shaikh

**487. History and Ethics of Medicine (1)**

Lecture—1.25 hours. Introduction to ethical problems and events in health care in both modern and historical contexts. Historical topics in medicine and medical ethics. (P/F grading only.)—W. (W.) Fitzgerald

**489. Directed Studies (1-9)**

Prerequisite: consent of instructor; individual directed studies in extended preparation for modified curriculum, USMLE exams, and/or as required by Committee on Student Progress. Independent studies to accommodate modified curriculums, prepare for taking USMLE exams and for remediation course work directed by the Committee on Student Progress. May be repeated for credit. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**489C. Clinical Reintroduction Experience (1-9)**

Clinical activity—20 hours. Prerequisite: consent of instructor. Learn and practice basic clinical skills in a supervised clinical setting. Skills include patient interviewing, history, physical examination, diagnostic and clinical reasoning, case presentation, and medical records documentation. Direct observation and individual feedback on clinical skills development is provided. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**489QA. Improving Quality in Health Care (3)**

Lecture—8 hours; discussion/laboratory—10 hours, project—10 hours. Prerequisite: consent of instructor. Working in interdisciplinary teams, will explore the theory and practical methods being employed to make improvement in health care systems while providing an opportunity for interprofessional educational experience. (H/P/F grading only; deferred grading only, pending completion of sequence.)—F. (F.) Bakerjian, Shaikh

**489QB. Improving Quality in Health Care (3)**

Lecture—8 hours; discussion/laboratory—10 hours, project—10 hours. Prerequisite: consent of instructor. Working in interdisciplinary teams, will explore the theory and practical methods being employed to

make improvement in health care systems while providing an opportunity for interprofessional educational experience. (H/P/F grading only; deferred grading only, pending completion of sequence.)—W. (W.) Bakerjian, Shaikh

#### **489R. USMLE Directed Remedial Studies (1-9)**

Independent study—20 hours. Prerequisite: recommendation by Committee on Student Progress. Independent studies to accommodate remediation for taking USMLE exams directed by the Committee on Student Progress. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Servis

#### **490A. PRIME Seminar Series: Fall Quarter (1)**

Lecture—1 hour. Weekly seminar series covering the following areas: community engagement, Health-care to rural and under served populations, health policy and advocacy, leadership, technology and health equity and disparity. May be repeated for credit. (P/F grading only.)—F. (F.) Eidson-Ton, Fancher

#### **490B. PRIME Seminar Series: Winter Quarter (1)**

Lecture—1 hour. Weekly seminar series covering the following areas: community engagement, Health-care to rural and under served populations, health policy and advocacy, leadership, technology and health equity and disparity. May be repeated for credit. (P/F grading only.)—W. (W.) Eidson-Ton, Fancher

#### **490C. PRIME Seminar Series: Spring Quarter (1)**

Lecture—1 hour. Weekly seminar series covering the following areas: community engagement, Health-care to rural and under served populations, health policy and advocacy, leadership, technology and health equity and disparity. May be repeated for credit. (P/F grading only.)—S. (S.) Eidson-Ton, Fancher

#### **490D. PRIME Seminar Series: Summer Quarter (1)**

Lecture—1 hour. Weekly seminar series covering the following areas: community engagement, Health-care to rural and under served populations, health policy and advocacy, leadership, technology and health equity and disparity. May be repeated for credit. (P/F grading only.)—Su. (Su.) Eidson-Ton, Fancher

#### **493. Independent Special Study Module (3-12)**

Prerequisite: consent of instructor. FYOC approval required. Student developed alternative to the SSM/SPO Requirement. Approval by FYOC is required. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **493A. International and Comparative Health Care—SSM (6)**

Discussion—20 hours; lecture—10 hours. Prerequisite: consent on instructor. Restricted to UC Davis School of Medicine students only. Through a series of lectures, seminars and clinical experiences, all occurring in other nations, students will research how health care systems address critical health issues. In 2007, Chronic Disease is the focal issue. SSM Component. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Wilkes

#### **493B. International and Comparative Health Care—Clinical (3-9)**

Clinical activity—30 hours. Prerequisite: consent of instructor. Restricted to UC Davis School of Medicine students only. Through a series of lectures, seminars and clinical experiences, all occurring in other nations, students will research how health care systems address critical health issues. In 2007, Chronic Disease is the focal issue. Clinical Component. (H/P/F grading only)—F, W, S, Su. (F, W, S, Su.) Wilkes

#### **493D. Teaching the Basic Sciences SSM (6)**

Lecture—6 hours; lecture/laboratory—8 hours; laboratory—30 hours; tutorial—10 hours. Prerequisite: course 440 concurrently; consent of instructor. Restricted to UC Davis School of Medicine students

only. Special Studies Module, a yearlong in progress court to teach lecture and discussion education technique and theory. (H/P/F grading only)—F, W, S, Su. (F, W, S, Su.)

#### **493Q. Improving Quality in Health Care (6)**

Lecture—8 hours; discussion/laboratory—10 hours; project—10 hours. Prerequisite: consent of instructor. Working in interdisciplinary teams, will explore the theory and practical methods being employed to make improvement in health care systems while providing an opportunity for interprofessional educational experience. (H/P/F grading only.)—F, W. (F, W.) Bakerjian, Shaikh

#### **493QA. Improving Quality in Health Care (3)**

Lecture—8 hours; discussion/laboratory—10 hours; project—10 hours. Prerequisite: consent on instructor. Working in interdisciplinary teams, will explore the theory and practical methods being employed to make improvement in health care systems while providing an opportunity for interprofessional educational experience. (Same course as Nursing 493A.) (H/P/F grading only; deferred grading only, pending completion of sequence.)—F. (F.) Bakerjian, Shaikh

#### **493QB. Improving Quality in Health Care (3)**

Lecture—8 hours; discussion/laboratory—10 hours; project—10 hours. Prerequisite: consent on instructor. Working in interdisciplinary teams, will explore the theory and practical methods being employed to make improvement in health care systems while providing an opportunity for interprofessional educational experience. (Same course as Nursing 493B.) (H/P/F grading only; deferred grading only, pending completion of sequence.)—W. (W.) Bakerjian, Shaikh

#### **493QC. Enhancing Patient Safety in Health Care (6)**

Seminar—6 hours; clinical activity—8 hours; discussion—6 hours. Prerequisite: fourth-year Medical student; consent of instructor. Inter-professional module is designed to explore the theory and practical methods being employed to improve patient safety in health care while providing an opportunity for inter-professional educational experience. (Same course as Nursing 493C.) (H/P/F grading only.)—W, S, Su. (W, S, Su.) Bakerjian, Natale

#### **494. Non-Clinical Medical Student Externship (3-9)**

Independent study—20 hours; clinical activity—10 hours. Prerequisite: consent of instructor. Restricted to students with approval of credit by the Fourth Year Oversight Committee. Generic course for awarding externship credit for medical student rotations that are not primarily focused on patient care. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Wallach

#### **495. Medicine Literature Review (1-9)**

Discussion—3-27 hours. Prerequisite: medical student in good academic standing and permission of the Associate Dean of Curricular Affairs. Independent study: topics for selection include, but are not restricted to, medical ethics, economics and jurisprudence, culture and medicine, ethnicity and medicine, gender and medicine, history of medicine, health manpower, and medical education. A prepared paper on the selected topic will be required. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **497. Scholarly Project (6)**

Seminar—0.25 hours; independent study—0.5 hours. Prerequisite: project proposal must be accepted by the Scholarly Project Executive Committee. (SPEC); consent of instructor. Restricted to 4th year medical school students only. Develop a research project on a focused topic area, implements the research, writes a publishable paper, and presents an oral summary of the project. (H/P/F grading only; deferred grading only, pending completion of sequence.)—F, W, S, Su. (F, W, S, Su.) Schaefer

#### **499. Research in Medical Education and Curriculum Development (4-9)**

Independent study—10-36 hours. Prerequisite: medical student in good standing and competency with computers. Research and development of an independent project related to expanding computer-assisted resources in support of the MD curriculum at UC Davis. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **Departmental Courses:**

#### **Anesthesiology and Pain Medicine (ANE)**

#### **Upper Division**

#### **192. Internship in Anesthesiology (1-6)**

Internship—3-18 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in anesthesia and related fields. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

#### **Professional**

#### **460. Anesthesiology Clinical Clerkship (3-18)**

Prerequisite: medical student. In-depth exposure to anesthesia through informal lectures and mentoring by anesthesiologists. Emphasis on understanding and applying anesthetic principles in managing administration of general, regional, and specialized areas. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Yao

#### **461. Perioperative Medicine (3-12)**

Clinical Activity—30 hours. Prerequisite: successful completion of third-year clerkships; consent of IOR. Two week rotation provides a broad exposure to various patient care services within the Department of Anesthesiology and Pain Medicine to apply medical knowledge to safely care for patients. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Pitts

#### **463. Multidisciplinary Pain Management (6)**

Clinical activity—30 hours; lecture/discussion—10 hours. Prerequisite: senior medical student in good standing. Senior clerkship to expose students to all facets of treating pain in all aspects of clinical care: outpatient and inpatient settings, acute and chronic pain, end of life issues, pediatrics, rehabilitation, etc. Daily clinics, rounds, and lectures. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Sheth

#### **465. Away Acting Internship in Anesthesiology (3-18)**

Clinical Activity—40 hours. Prerequisite: satisfactory completion of Anesthesiology Clerkship; consent of instructor. Work at the level of a sub intern in Inpatient and/or Outpatient settings. Expectation is to provide direct patient management. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Yao

#### **480. Brief Introduction to Clinical Anesthesiology and Chronic Pain Management (3)**

Clinical activity—25-30 hours (two weeks). Prerequisite: second-year medical student. Daily experience in clinical anesthesiology at the preoperative screening unit, operating room, post anesthesia care unit, chronic pain management clinic with daily clinical correlation case discussions, and one-on-one interaction with faculty anesthesiologists. (H/P/F grading only.)—W. (W.) Fishman

#### **493A. Applied Physiology and Pharmacology (6)**

Lecture—5 hours; lecture/laboratory—10 hours; laboratory—16 hours; clinical activity—4 hours. Prerequisite: consent of instructor. UC Davis School of Medicine students only. Review and demonstrate the application of basic physiology and pharmacology to patient care. There will be an in-depth analysis of

the physiology and pharmacology of the cardiovascular, pulmonary, nervous, renal and endocrine systems. (H/P/F grading only.)—W. (W.) Fleming

### **493B. Interdisciplinary Medicine in Pain Care (6)**

Lecture—5 hours; lecture/laboratory—10 hours; laboratory—16 hours; clinical activity—4 hours. Prerequisite: consent of instructor. UC Davis School of Medicine students only. Integrate applied and practical neuroanatomy, physiology, pharmacology, psychology/psychiatry and social medicine in the care of patients who are receiving care for pain caused by acute or chronic medical disease or trauma. (H/P/F grading only.)—S. (S.) Fishman

### **498. Individual or Group Study (1-5)**

Discussion—1-5 hours; laboratory—2-10 hours. Prerequisite: interns and residents with consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

### **499. Anesthesiology Research (4-18)**

Laboratory—12-54 hours. Prerequisite: third- or fourth-year medical students, advanced standing undergraduate and veterinary medicine students; or consent of instructor. Problems in clinical and/or laboratory research. May be repeated for credit. (H/P/F grading only for medical students.)—F, W, S, Su. (F, W, S, Su.)

## **Biological Chemistry (BCM)**

### **Lower Division**

#### **92. Internship in Biological Chemistry (1-12)**

Internship—3-36 hours; final report. Prerequisite: consent of instructor. Supervised work experience in biological chemistry and related fields. (P/NP grading only.)

### **Upper Division**

#### **192. Internship in Biological Chemistry (1-12)**

Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to internship by preceptor. Supervised work experience in Biological Chemistry and related fields. (P/NP grading only.)

### **198. Group Study (1-5)**

Prerequisite: consent of instructor. For undergraduate students desiring to explore particular topics in depth. Lectures and conferences may be involved. (P/NP grading only.)

### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

## **Graduate**

#### **209. Prostaglandins/Leukotrienes and Related Lipids (2)**

Lecture—2 hours. Prerequisite: Biochemistry 101A-101B or Physiological Sciences 101A-101B or Physiology 100A-100B. Oxidative desaturation/elongation of polyunsaturated fatty acids. Biosynthesis of prostaglandins/leukotrienes from polyunsaturated fatty acids. Chemistry, biochemistry, and metabolism. Nutritional regulation. Physiological/pathophysiological implications; pharmacological and clinical relevance. Offered in alternate years.—(W.) Ziboh

### **217. Molecular Genetics of Fungi (3)**

Lecture—3 hours. Prerequisite: graduate standing in a biological science; Biochemistry 101B; Genetics 100, 102A; Botany 119; Plant Pathology 130, 215X; Microbiology 215 recommended. Advanced treatment of molecular biology and genetics of filamentous fungi and yeasts, including gene structure, organization and regulation; secretion; control of reproduction; molecular evolution; transformation; and gene manipulation. Offered in alternate years. (Same course as Plant Pathology 217.)—W. Holland, Tyler

### **222. Mechanisms of Translational Control (2)**

Lecture—1 hour; discussion—1 hour. Prerequisite: Biochemistry 201C or consent of instructor. Molecular mechanisms of protein synthesis and translational control in eukaryotic cells, with emphasis on mammalian cells and their viruses. An advanced graduate-level treatment of topics of current interest, with readings and discussion of primary papers from the literature. Offered in alternate years.—W. Hershey

### **230. Practical NMR Spectroscopy and Imaging (1)**

Lecture—1 hour. Prerequisite: Chemistry 107A-107B, Physics 5A-5B-5C or 9A-9B-9C, or consent of instructor. Basic theory, experimental methods, and instrumentation of NMR. Enables students to understand NMR spectroscopy and imaging experiments. (S/U grading only.)—F. (F.)

### **231. Biological Nuclear Magnetic Resonance (3)**

Lecture—3 hours. Prerequisite: Molecular and Cellular Biology 221A or the equivalent or consent of instructor. Principles and applications of magnetic resonance in biomedicine. Fundamental concepts and the biophysical basis for magnetic resonance applications in areas of tissue characterization/imaging, metabolic regulation, and cellular bioenergetics. (Same course as Biophysics 231.)—S. (S.) Jue

### **291. Seminar in Genetic Approaches to Pathogenesis of Human Disease (1)**

Seminar—1 hour. Prerequisite: student in Genetics Graduate Group or consent of instructor. Current genetic approaches to understanding the pathogenesis of disease and mammalian development presented and critically discussed by faculty, fellows and students. Topics include Mendelian and non-Mendelian diseases, imprinting, homologous recombination, statistical methods, genetic epidemiology and cell cycle dependent expression. (Same course as course 491.) (S/U grading only.)—F, W, S, Su. (F, W, S, Su.)

### **298. Group Study (1-5)**

Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved.

### **299. Research (1-12)**

Prerequisite: consent of instructor. (S/U grading only.)

## **Professional**

### **410A. Molecular Medicine (4)**

Lecture—3 hours; discussion—3 hours; web virtual lecture—1 hour. Prerequisite: consent of instructor. Restricted to Medical Students only. Biochemistry of proteins and nucleic acids. Includes an introduction to cancer biology and a full discussion of carbohydrate metabolism. Molecular aspects of human disease are highlighted throughout the course. (P/F grading only; deferred grading only, pending completion of sequence.)—F, Su. (F, Su.) Sweeney

### **491. Seminar in Genetic Approaches to Pathogenesis of Human Disease (1)**

Seminar—1 hour. Prerequisite: student in Genetics Graduate Group or consent of instructor. Current genetic approaches to understanding the pathogenesis of disease and mammalian development presented and critically discussed by faculty, fellows and students. Topics include Mendelian and non-Mendelian diseases, imprinting, homologous recombination, statistical methods, genetic epidemiology and cell cycle dependent expression. (Same course as course 291.) (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

### **493. Medical Genomics (6)**

Clinical activity—4 hours; lecture—4 hours; laboratory—12 hours. Prerequisite: consent of instructor. Four-week module will focus on the clinical methods and applications of medical genomics. Topics will include an introduction to the human genome and human genomics, genetic and epigenetic variation and the ethics of medical genomics. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Herman, Segal

### **497T. Tutoring in Biological Chemistry (1-5)**

Tutoring—3-15 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (H/P/F grading only.)

### **498. Group Study (1-5)**

Prerequisite: medical students with consent of instructor. (H/P/F grading only.)

### **499. Research (1-12)**

Prerequisite: medical students with consent of instructor. (H/P/F grading only.)

## **Courses in Cell Biology and Human Anatomy (CHA)**

### **Upper Division**

#### **101. Human Gross Anatomy (4)**

Lecture—4 hours. Prerequisite: Biological Sciences 2A; concurrent enrollment in Exercise Biology 106L or course 101L strongly recommended. Upper division students only; Pass One open to upper division Exercise Biology or Anthropology majors only; Pass Two open to Seniors in any major; open enrollment at the start of the quarter for upper division students in any major. Detailed study of the gross anatomical structure of the human body, with emphasis on function and clinical relevance to students entering health care professions. (Same course as Exercise Biology 106.) GE credit: SciEng | SE. —W. (W.) Gross

#### **101L. Human Gross Anatomy Laboratory (3)**

Laboratory—9 hours. Prerequisite: Biological Sciences 2A; must take Exercise Biology 106 or course 101 concurrently (or have already completed). Upper division students only; Pass One open to upper division Exercise Biology or Anthropology majors only; Pass Two open to Seniors in any major; open enrollment at the start of the quarter for upper division students in any major; mandatory attendance on first day of lab. Detailed study of dissected human cadavers in small group format with extensive hands-on experience. (Same course as Exercise Biology 106L.) GE credit: SciEng | SE. —W. (W.) Gross

#### **192. Internship in Morphology (1-12)**

Internship—3-36 hours; final report. Prerequisite: upper division standing; laboratory science experience including some chemistry; approval of project by preceptor prior to period of internship. Experience of supervised internship in research laboratories of members of the department. (P/NP grading only.)

#### **197T. Tutoring in Cell Biology and Human Anatomy (1-5)**

Discussion—1 hour; laboratory—6-9 hours. Prerequisite: completion of course 101 with a grade of B or better and consent of instructor. Provides laboratory instruction in gross and microscopic human anatomy, with small groups of undergraduates under the supervision of the instructor. (S/U grading only.)

#### **198. Directed Group Study (1-5)**

Discussion—1-10 hours. Prerequisite: consent of instructor. Directed reading, discussion, and/or laboratory experience on selected topics. (P/NP grading only.)

#### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

## **Graduate**

#### **200. Graduate Human Gross Anatomy (6)**

Lecture—4 hours; laboratory—6 hours. Prerequisite: consent of instructor. Lectures on human gross anatomy and cadaver dissection laboratory. Topics arranged by region; emphasis on osteology, neuromuscular anatomy, cardiovascular anatomy, gastrointestinal anatomy and anatomy of reproductive systems. Only two units of credit for students who

have completed course 101. Open only to full-time graduate students.—W. (W.) Blankenship, Gross, Tucker

### **202. Human Microscopic Anatomy (5)**

Lecture—3 hours; laboratory—6 hours. Examines the normal microscopic structure of the basic cells, tissues, and organs of the body. Lectures emphasize morphology and structure-function relationships. Accompanying laboratories involve analysis and identification of sectioned material at the light microscopic and ultrastructural levels.—W. (W.) Beck

### **203. Neurobiology (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: two upper division or one graduate course in Neurobiology, consent of instructor. Physiology and anatomy of the normal human nervous system in an integrated format.—S. (S.) Blankenship, Gross

### **290. Seminar (1)**

Seminar—1 hour. Prerequisite: consent of instructor. (S/U grading only.)—F, S. (F, S.)

### **290C. Research Group Conference (1)**

Discussion—1 hour. Prerequisite: graduate student with research experience (may be taken concurrently); consent of instructor. Discussion of problems, progress and literature relevant to current research undertaken by laboratory groups in Human Anatomy. (S/U grading only.)—F, W, S. (F, W, S.)

### **298. Advanced Group Study (1-5)**

Prerequisite: consent of instructor.

### **299. Research (1-12)**

Prerequisite: consent of instructor. (S/U grading only.)

## **Professional**

### **400. Developmental, Gross, and Radiologic Anatomy (7.5)**

Lecture—3 hours; laboratory—5 hours. Prerequisite: consent of instructor. Medical Students only. An integrated presentation of developmental, gross and radiologic anatomy. Embryology and radiology correlated with the dissection of the entire body. Embryology from implantation to birth. (Deferred grading only, pending completion of sequence.) (P/F grading only.)—F, Su. (F, Su.) Tucker

### **402. Cell and Tissue Biology (4.5)**

Lecture—2 hours; laboratory—4 hours. Prerequisite: approval of the Committee on Student Progress. Medical Students only. Microscopic structure of the basic cells, tissues and organs of the body with an emphasis on how structure explains function. Analysis and identification of sectioned material at the light microscopic and ultrastructural levels. (Deferred grading only, pending completion of sequence.) (P/F grading only.)—F, Su. (F, Su.) Beck

### **403. Medical Neuroanatomy (5)**

Lecture—3 hours; laboratory—1 hour; discussion/laboratory—1 hour. Prerequisite: successful completion of course 400, block 1; restricted to medical students only. Anatomy of the normal human nervous system, to include gross external and internal morphology of brain and spinal cord, and function neuroanatomy of motor, sensory and cognitive systems. Incorporates application of neuroanatomy to clinical problem solving. (Same course as Human Physiology 403.) (P/F grading only.)—Su. (Su.) Blankenship, Gross

### **493. Clinically-Oriented Anatomy Special Study Module (6)**

Lecture—5 hours; lecture/laboratory—10 hours; laboratory—16 hours; clinical activity—4 hours. Prerequisite: consent of instructor. Restricted to School of Medicine students only. Reviews aspects of the anatomy of the head and neck, thoracic cavity, abdomen, pelvis, extremities, vascular system, peripheral nervous system and central nervous system. Focus on the understanding of anatomy related to common surgical procedures. (Same course as Surgery 493.) (H/P/F grading only.)—S. (S.) Blankenship, Khatri

### **493B. Anatomy Medical Education Special Study Module (6)**

Seminar—10 hours; clinical activity—14 hours; autotutorial—6 hours; independent study—10 hours. Prerequisite: consent of instructor; UC Davis School of Medicine students only. Attend all of the lectures and laboratory sessions for courses 400 and 402 during the four-week section (approximately seven anatomy labs and three to four histology labs); tutor first-year students during the laboratory sessions; prepare and present a clinical correlate session. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Beck, Gross, Fitzgerald, Tucker

### **497T. Tutoring in Human Anatomy (1-5)**

Tutoring—3-15 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum for the School of Medicine. (H/P/F grading only.)

### **498. Advanced Group Study (1-12)**

Prerequisite: medical students, interns, and residents with consent of instructor. Directed reading and group discussion and/or laboratory experience on selected topics. (H/P/F grading only.)

### **499. Research (1-12)**

Prerequisite: consent of instructor. (H/P/F grading only.)

## **Clinical Research (CLH)**

### **Graduate**

### **200. Introduction to Clinical Research (3)**

Lecture—2 hours; independent study—3 hours. Prerequisite: one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing. Application and acceptance into the Clinical Research Graduate Group, K30 program or other SOM/CTSC training programs; consent of instructor. Introduction to the CRGG program and overview of major clinical research topics. Overview of basic clinical skills needed to accomplish CRGG mentored research project. (Formerly Medical Science 460CR.) (S/U grading only.)—Su. (Su.) Meyers

### **201. Strategies for Grant Writing (2)**

Lecture—2 hours. Prerequisite: consent of instructor; completed one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing. Application and acceptance into the Clinical Research Graduate Group, K30 program or other SOM/CTSC training programs. Practical skills and strategies to create successful grant proposals in NIH style/format. Generating ideas, identifying and accessing research resources, grant components, specific aims, background and significance, preliminary studies, budgets, and bios. Matriculation through UC system, and resubmissions. (Former course Medical Sciences 461CR.) (S/U grading only.)—Su. (Su.) Ruledge

### **202. Introduction to Clinical Epidemiology and Study Design (3)**

Lecture—25 hours; discussion—10 hours. Prerequisite: completed one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing; application and acceptance into the Clinical Research Graduate Group, (K30) program, or other SOM/CTSC training programs. Anatomy and physiology of conducting clinical epidemiologic research. Familiarity with three basic study designs (cross-sectional, case-control, and cohort). Discussion of principles of measurements in clinical epidemiological studies, basic methods for analyzing data, and ethical issues involved in conducting research. (Formerly Medical Sciences 462CR.) (S/U grading only.)—Su. (Su.) McCurdy, Romano

### **203. Methods in Clinical Research (3)**

Lecture—4 hours; discussion—1 hour; independent study—10 hours. Prerequisite: completed one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program or other SOM training programs; consent of instructor. Overview of major

approaches to clinical research, including health services research techniques, informatics, GCRC, and preclinical methodologies to enhance clinical projects. Overview of UCD clinical research support infrastructure. Methodologies applicable to clinical research and its multi-disciplinary perspective. (S/U grading only.)—Su. (Su.) Schweitzer

### **204. The Ethics of Research (1)**

Lecture—3 hours. Prerequisite: consent of instructor. Priority given to those with acceptance into the Clinical Research Graduate Group, K12, T32 or other SOM/CTSC training program. Acquire information about ethical responsibilities; Explore major questions in ethics; Apply ethical principles, concepts and values; Gain an appreciation of the role of trust in scientific research. Recommend three quarters of CLH204. Must enroll in Fall to continue through Spring. (S/U grading only.)—F, W, S. (F, W, S.) Yarborough

### **205. Introduction to Medical Statistics (4)**

Lecture—3 hours; laboratory—2 hours. Prerequisite: completed one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program or other SOM training program; consent of instructor. Biomedical applications of statistical methods in clinical, laboratory, population medicine. Graphical/tabular data presentation, probability, binomial, Poisson, normal, t-, F-, and Chi-square distributions, elementary nonparametric methods, simple linear regression/correlation, life tables. Microcomputer applications of statistical procedures in population medicine. (Formerly Medical Sciences 465CR.) (S/U grading only.)—Su. (Su.) Yang

### **207. Team Science (1)**

Lecture/discussion—1 hour. Prerequisite: participation in CTSC Research Education and Training Programs, or consent of instructor. Restricted to 25 students. Today's scientific challenges necessitate cross-disciplinary engagement and high collaboration levels. This course offers guidance on how best to engage in team science to pursue complex questions, work effectively with team members, and produce high impact research that meets society's needs. (S/U grading only.)—S. (S.) Crumley, Meyers

### **208. Introduction to Grant Writing, I (2)**

Lecture/discussion—2 hours; extensive writing. First in a two-quarter series. Scholars are encouraged to enroll in both classes. The two-course sequence provides training in practical aspects of competitive grant writing. The focus is NIH, but information will apply to other funding agencies. (S/U grading only.)—F. (F.) Chedin, Guo, Ozonoff

### **209. Introduction to Grant Writing, II (1)**

Lecture/discussion—1 hour. Prerequisite: course 208; consent of instructor. Restricted to students who have completed course 208. Second in a two-quarter series. Two-course sequence provides training in practical aspects of competitive grant writing. (S/U grading only.)—W. (W.) Chedin, Guo, Ozonoff

### **210Y. Principles and Methods of Comparative Effectiveness Research (4)**

Web virtual lecture—4 hours; discussion—2 hours; project—6 hours; web electronic discussion. Prerequisite: familiarity with research methodology, and a course in introductory statistics; consent of instructor. Provides an introduction to Comparative Effectiveness Research (CER) and methods for conducting CER. (S/U grading only.)—S. (S.) Fancher, Kravitz, Leigh, Melnikow, Romano, Tancredi

### **211. Critical Assessment of the Biomedical Literature (1)**

Lecture/discussion—1 hour. Prerequisite: consent of instructor. Exposes students to topical issues and controversies in the design of interdisciplinary translational research, with an emphasis on critical assessment of the biomedical and health sciences literature. The course extends students' knowledge of study design through practical application. May be repeated three times for credit. (S/U grading only.)—F, W, S. (F, W, S.) Bold, Franks, Lane, Romano

**212. Introduction to Stem Cell Biology (3)**

Lecture/discussion—1 hour. Prerequisite: consent of instructor. Introduction to Stem Cell Biology. Each week will focus on different aspects of stem cells, including general concepts, stem cells in lower organisms, embryonic stem cells and cellular reprogramming. Open to graduate students with a fundamental knowledge of cell biology.—F. (F.) Fierro

**220. Basics of Stem and Progenitor Cells (1)**

Lecture—1 hour. Prerequisite: Molecular, Cellular, and Integrative Physiology 200, 200L; consent of instructor; graduate standing. This is a lecture course designed for graduate students who have experience in cell culture techniques. It is designed to give a broad overview of the field and current cells of interest to the greater research community. (S/U grading only.)—S. (S.) Tarantal

**222. Ethical Issues in Stem Cell Biology (1)**

Lecture/discussion—1 hour. Prerequisite: consent of instructor; graduate standing. Critical presentation and analysis of recent articles in stem cell biology and small group discussions of the ethical issues surrounding this area of research. (S/U grading only.)—W. (W.) Ikemoto, Rich

**230. Congestive Heart Failure, Mechanism of Disease (3)**

Lecture/discussion—2 hours; project. Prerequisite: consent of instructor; graduate standing. Underlying mechanisms of cardiomyopathy and heart failure. Presentation of fundamental knowledge of and recent basic research on heart failure. Student team projects: investigation and presentation of a research topic and bench research project to advance research in the same area.—W. (W.) Knowlton

**231. Current Techniques in Clinical Research (2)**

Lecture—1 hour; clinical activity—3 hours. Prerequisite: consent of instructor and graduate standing; completion of course 250. Current techniques used in clinical research such as electrophysiology, cardiovascular surgery, cardiac catheterization and echocardiography, team science, and patient management. Lectures are presented by experts on each technique, with an emphasis on use in translational research. (S/U grading only.)—F, W, S, Su. (F, W, S, Su.)

**233. Molecular Mechanisms of Disease: Cancer (3)**

Lecture/discussion—2 hours; project—3 hours. Prerequisite: consent of instructor. Restricted to students pursuing the designated emphasis in Translational Research; graduate standing. Cutting edge of research on underlying mechanisms of cancer development, progression and prevention-clinical trials/drug development, signaling pathways and molecular mechanisms of cancer development, recent basic research on cancer stem cells, genetics and epigenetic events and animal models used.—W. (W.) Goldkorn

**240. Predoctoral Clinical Research Training Program Research Integration (1)**

Seminar—0.5 hours; discussion—0.5 hours. Prerequisite: consent of instructor and enrollment in the Predoctoral Clinical Research Training Program in the CTSC, School of Medicine. Alternating sessions: journal club, seminar/discussion, and research integration sessions. May be repeated three times for credit (S/U grading only.)—F, W, S. (F, W, S.) Kenyon

**245. Biostatistics for Biomedical Science (4)**

Lecture—4 hours. Prerequisite: course 244 or Public Health Sciences 244 or the equivalent; consent of instructor. Analysis of data and design of experiments for laboratory data. (Same course as Public Health Sciences 245.)—W. (W.) Kim

**246. Biostatistics for Clinical Research (4)**

Lecture—4 hours. Prerequisite: course 245 or Public Health Sciences 245. Emphasizes critical biostatistics for clinical research and targets biomedical audience. Students will develop understanding for basic planning and analysis of clinical studies and learn to develop collaborations with biostatisticians. (Same

course as Public Health Sciences 246.) May be repeated for credit. Offered in alternate years.—W. Qi

**247. Statistical Analysis for Laboratory Data (4)**

Lecture—4 hours. Prerequisite: course 245 or Public Health Sciences 245. Statistical methods for experimental design and analysis of laboratory data including gene expression arrays, RNA-Seq, and mass spec. (Same course as Public Health Sciences 247.)—S. (S.) Rocke

**250. Integrating Medicine Into Basic Science (6)**

Lecture—3.75 hours; discussion—6 hours; seminar—2.5 hours; clinical—8 hours. Prerequisite: consent of instructor. Graduate standing; acceptance into HHMI Integrating Medicine into Basic Science program. Four-week summer institute consisting of didactic lectures, reading assignments, group discussions, and clinical rotations to acculturate students to the human medical environment; integrate medical principles, physiology and pathophysiology into basic research; introduce high-impact clinical studies related to medicine and health. (S/U grading only.)—Su. (Su.) Knowlton, Robbins, Stevenson

**290A. Hot Topics in Clinical Research (1)**

Seminar—1 hour. Prerequisite: graduate standing or consent of instructor. Seminars presented by guest lecturers on subjects of their own research activities. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**290B. Hot Topics in Stem Cell Biology (1)**

Seminar—1 hour. Prerequisite: graduate standing. Seminars presented by guest lecturers on subjects of their own research. (S/U grading only.)—F, W, S. (F, W, S.)

**290C. Literature in Translational Research (1)**

Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Critical presentation and analysis of recent journal articles in translational research by students. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.) Knowlton

**290D. Literature in Translational Research (1)**

Discussion—1 hour. Prerequisite: consent of instructor; graduate standing. Critical presentation and analysis of recent journal articles in translational research by students. May be repeated for credit. (S/U grading only.)—F. (F.) Knowlton

**298. Group Study in Clinical Research (1-5)**

Prerequisite: consent of instructor. Special topics in Clinical Research appropriate for group study at the graduate level. Restricted to students enrolled in the Mentored Clinical Research Training Program. (S/U grading only.)

**299. Clinical Research (1-5)**

Prerequisite: consent of instructor. Independent research and special topics in clinical research appropriate for graduate level. Restricted to students enrolled in the Mentored Clinical Research Training Program. (S/U grading only.)

**Dermatology (DER)****Upper Division****192. Internship in Cutaneous Biology (1-4)**

Internship—8-20 hours; final report. Prerequisite: upper division standing or consent of instructor. Approval of project prior to internship by preceptor. Supervised work experience involving research on the skin. (P/NP grading only.)—Isseroff, Izumiya, Liu, Murphy, Takada

**199. Special Study in Cutaneous Biology (1-4)**

Prerequisite: advanced undergraduate standing and/or consent of instructor. Special study by individual arrangement of specialized topics in biology of skin. Work may be assigned readings, laboratory research or a combination. (P/NP grading only.) Isseroff, Izumiya, Liu, Murphy, Takada

**Graduate****299. Research in Cutaneous Biology (1-12)**

Laboratory—3-36 hours. Prerequisite: consent of instructor. Independent research in cellular and biochemical mechanisms of cutaneous biology and pathology. (S/U grading only.) Isseroff, Liu

**Professional****420. Integumentary System (2)**

Lecture/discussion—3 hours; clinical activity—0.25 hours. Prerequisite: approval of School of Medicine Committee on Student Promotions. Restricted to Medical students only; student must have passed all SOM Year 1 courses. Cell biology, pathology, and physical diagnosis of the skin. Recognition of normal variations, and common or important dermatoses. Patient demonstrations of select conditions. (P/F grading only.)—F. (F.) Eisen, Isseroff

**460. Dermatology Clinical Clerkship (6)**

Clinical activity (inpatient/outpatient service)—40 hours for four weeks. Prerequisite: completion of three years of medical school; or consent of instructor. Limited enrollment. Observation and participation in dermatology clinics/practice and participation in Ward Rounds and Dermatology Clinics at UC Davis Medical Center, Kaiser, and private practitioner offices.—F, W, S, Su. (F, W, S, Su.) Fazel

**465. Specialty Externship in Dermatology (3-16)**

Clinical Activity—30 hours. Prerequisite: consent of instructor. Externship provides in-depth exposure to one of a variety of subspecialties in Dermatology. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Fazel

**466. Away Acting Internship in Dermatology (3-18)**

Clinical Activity—40 hours; lecture—6 hours. Prerequisite: consent of instructor. Work at the level of a sub intern in Inpatient and/or Outpatient settings. Expectation is to provide direct patient management. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Fazel

**470. Introduction to Dermatopathology (6)**

Clinical—20 hours; independent study—20 hours; lecture/discussion—6 hours. Prerequisite: previous rotation in a Dermatology Clerkship; consent of instructor. Restricted to fourth year medical student. Integrated, multi-specialty approach to the microscopic diagnosis of inflammatory and neoplastic skin disorders. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Barr, Fung, Konia

**475. Telehealth in Dermatology (6)**

Clinical activity—4 hours; project—36 hours. Restricted to Medical students. Introduction to the application of telehealth in dermatology to provide diagnoses, consultation, treatment, and education. Participate in teledermatology clinics with remote sites throughout California, conduct telehealth project(s), and review the latest literature in telehealth application in improving healthcare access. May be repeated up to six units for credit for additional time needed to complete telehealth project or to work on new telehealth projects. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Armstrong

**480. Insights in Dermatology (1-3)**

Clinical activity—3-9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Clinical experience limited to observation of delivery of dermatologic care and attendance at some conferences. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**495. Wound Healing: From Bench to Bedside (6)**

Clinical activity—12 hours; laboratory—8 hours; autotutorial—15 hours; term paper. Prerequisite: consent of instructor. Restricted to medical students only. An integrated, multi-specialty approach to clinical soft tissue wound healing.—F, W, S, Su. (F, W, S, Su.) Isseroff

**498. Special Topics in Clinical Dermatology (1-6)**

Independent study—3-18 hours. Prerequisite: medical students with consent of instructor. Individually arranged study of special topics in clinical dermatology determined by student and instructor. Assigned readings and/or clinical examination of selected patients. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Armstrong

**499. Research in Cutaneous Biology (1-12)**

Laboratory—3-36 hours. Prerequisite: consent of instructor. Research, either laboratory or clinical, on ongoing projects within the department under supervision of faculty. (H/P/F grading only.)—Armstrong

**Emergency Medicine (EMR)****Lower Division****92. Emergency Medicine Clinical Research Internship (1-4)**

Prerequisite: undergraduate student in good academic standing at UC Davis; consent of instructor. Intended to give the undergraduate student an opportunity to conduct "hands-on" clinical research in the Emergency Department. Through the lecture/discussion, students will learn the basics of conducting and developing clinical research studies, using examples from ongoing studies. May be repeated for credit up to four units. Units awarded will depend on hours worked.—F, W, S, Su. (F, W, S, Su.) Nishijima

**Upper Division****192. Emergency Medicine Clinical Research Internship (1-4)**

Internship—6-12 hours. Prerequisite: undergraduate student in good academic standing at UC Davis; consent of instructor. Intended to give the upper division undergraduate student an opportunity to conduct "hands-on" clinical research in the Emergency Department. Through the lecture/discussion, students learn the basics of conducting and developing clinical research studies. May be repeated two times for credit. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.) Nishijima

**199A. Special Study for Advanced Undergraduates (4-12)**

Prerequisite: experienced RA's who have successfully performed in the EMRAP program for a minimum of 3 quarters; consent of instructor; must have database skills. For students interested in working on specific EM projects in a more extensive way. Must commit at least four hours per week for two quarters. Will be awarded credit upon completion of course 199B. (Deferred grading only, pending completion of sequence.)—F, W, S, Su. (F, W, S, Su.) Nishijima

**Professional****401. Preceptorship in Emergency Medicine (1-6)**

Clinical activity—10 hours. Prerequisite: consent of instructor. Exposure to the specialty of Emergency Medicine and observation of a wide array of patients in the Emergency Department. May be repeated for credit. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Bing

**430. Introduction to Medical Toxicology (3-6)**

Prerequisite: fourth-year medical student in good standing; consent of instructor. In-depth review of clinical and medical toxicologic emergencies. Rotation includes contact with toxicology trained emergency faculty, didactic lectures, journal club, simulation training and exposure to a very busy poison control center. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Ford

**435. Wilderness Medicine (3-6)**

Lecture/discussion—20 hours; clinical activity—12 hours; independent study—8 hours. Prerequisite: consent of instructor. Elective is designed as an introductory course for students who want to explore how physicians can interact with the environment in aus-

tere conditions through lectures, hands-on/field experience, and case-based learning. (H/P/F grading only.)—Bing

**440. Emergency Medicine Clerkship (6)**

Clinical activity—46 hours; lecture/discussion—4 hours. Prerequisite: satisfactory completion of Medicine, Surgery, and Pediatric Clerkship. Students complete clinical shifts in the Emergency Department, functioning as Acting Intern. Treat a wide variety of patients and problems under the supervision of the EM Attending. Students are expected to take focused histories and present in clear, concise fashion. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Jones

**445. Emergency Medicine Ultrasound for Fourth-Year Medical Student (3-6)**

Prerequisite: fourth-year Medical Student in good standing; interest in Emergency Medicine or Critical Care is recommended; course 440 or equivalent is recommended prior to the rotation. Limited enrollment. Intended for students interested in learning both the technical and cognitive skills of bedside ultrasound. Emphasis will be on the use of ultrasound in emergency medicine as a diagnostic tool and in procedural guidance. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Kelley

**450. Ambulatory Externship in Emergency Medicine (3-18)**

Restricted to MS4 students in good standing; externships/away rotations only. Credit will be given for approved non-AI Emergency Medicine courses at other institutions to which there is not an equal learning experience at UC Davis. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Jones

**465. Externship in Emergency Medicine (3-9)**

Clinical activity—36 hours; lecture/discussion—4 hours. Prerequisite: satisfactory completion of Medicine, Surgery and Pediatrics. Students complete clinical shifts in the Emergency Department, functioning as Acting Intern. Treat a wide variety of patients and problems under the supervision of the EM Attending. Students are expected to take focused histories and present in clear, concise fashion. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Jones

**470. Pediatric Emergency Medicine Clerkship (6)**

Clinical activity—36 hours; lecture/discussion—4 hours. Prerequisite: satisfactory completion of Medicine, Surgery, Pediatrics. Restricted to fourth-year medical student in good standing only. See patients in the Pediatric area of the Emergency Department under the supervision of an Emergency Medicine Attending. Emphasis on recognition and management of the acutely ill pediatric patient and treatment of common pediatric complaints. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Vance

**480. Understanding Health Policy: A Focus on Analysis and Translation (1-6)**

Lecture—4 hours; discussion—16 hours; independent study—10 hours. Prerequisite: consent of instructor. The paradigm of healthcare delivery in the US is changing rapidly. To prepare the next generation of physician leaders, this course will provide students with the skills, tools, and knowledge needed to impact decisions made at the policy level. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Moulin

**490. Emergency Procedures Elective (3)**

Lecture/discussion—24 hours; web virtual lecture—8 hours; tutorial—4 hours; independent study—4 hours. Prerequisite: current basic life support (BLS) certification. Restricted to fourth-year medical student in good standing only. Simulator-based skills training for emergency procedures. Topics include airway management, central venous access, chest tube placement, and general critical care resuscitation skills. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Barton

**493A. Cardiac Arrest, Resuscitation and Reparfusion SSM (3)**

Lecture—5 hours; lecture/laboratory—10 hours; laboratory—16 hours; clinical activity—4 hours. Prerequisite: consent on instructor. Restricted to UC Davis School of Medicine students only. Special Studies

Module, a four week course specific to the topics of Cardiac Arrest, Resuscitation and Reparfusion. (Deferred grading only, pending completion of sequence. H/P/F grading only.)—F, (F,) Barnes, Laurin

**493B. Cardiac Arrest, Resuscitation and Reparfusion SSM (3)**

Lecture—5 hours; lecture/laboratory—10 hours; laboratory—16 hours; clinical activity—4 hours. Prerequisite: consent on instructor. Restricted to UC Davis School of Medicine students only. Special Studies Module, a four week course specific to the topics of Cardiac Arrest, Resuscitation and Reparfusion. (Deferred grading only, pending completion of sequence. H/P/F grading only.)—F, S, (F, S,) Barnes, Laurin

**499. Research (2-18)**

Laboratory—full time (1 to 12 weeks). Prerequisite: consent of instructor. Elective where topics may be selected in either basic or clinical research areas of Emergency and/or Critical Care Medicine. The goals will be tailored to each individual student. Enrollment requires prior discussion and consent of instructor. (H/P/F grading only.)

**Family and Community Medicine (FAP)****Lower Division****92C. Primary Care Clinics (2)**

Clinical activity—6-8 hours; seminar—2 hours; lecture—1-2 hours. Prerequisite: consent of instructor, enrollment at the UC Davis campus, for freshman and sophomore students. Students must apply and interview with the Board of Clinica Tepati or Imani Clinic. Field experience exposes lower division students to health care delivery, patient histories, physical examinations, health promotion, disease prevention, diagnosis; treatment of episodic, acute, chronic illness; appropriate referral and follow-up. May be repeated for credit. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.) Edison-Ton, Hitzeman, Smith

**Upper Division****192C. Primary Care Clinics (1-2)**

Clinical activity—6-8 hours; seminar—2 hours; lecture—1-2 hours. Prerequisite: consent of instructor, enrollment at the UC Davis campus, upper-division standing. Students must apply and interview with the Board of Clinica Tepati or Imani Clinic. Field experience introduces students to health care delivery, patient histories and physical examinations, health promotions and disease prevention, diagnosis and treatment of episodic, acute and chronic illness, basic laboratory testing and appropriate referral and follow-up. May be repeated for credit. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.) Edison-Ton, Hitzeman, Smith

**195. Health Care to Underserved Populations (1)**

Lecture—1 hour. Prerequisite: sociology, political science, or applied behavioral science background recommended, or registration in medical school. Discusses sociocultural perspectives of underserved populations in California impacting their health; roles of family/interpersonal relationships in making health care decisions; and clinician's perspectives in treating people of cultures which are unfamiliar and/or uncomfortable with Western medicine. May be repeated for credit. (P/NP grading only.)—F, S, (F, S,) Edison-Ton, Nesbitt, Srinivasan

**Professional****401. Introductory Preceptorship in Family Practice (3-9)**

Clinical activity—20-40 hours. Prerequisite: completion of first year of medical training. Preceptorship in family practice offered as an introduction to clinical medicine. 20 hours or 40 hours per week in a family physician's office, doing patient interviews, history-taking, and performing physical exams. (H/P/F grading only.)—S, Su. (S, Su.) Edison-Ton

**405. The Healer's Art (1)**

Lecture—0.6 hours; workshop—3 hours. Prerequisite: consent of instructor. Limited to first-year medical students. Learning to strengthen your humanity and remain open-hearted can make the difference between professional burnout and a fulfilling life. Opportunity to learn tools for self care, healing loss, finding meaning, strengthening commitment and becoming a true physician. (P/F grading only.)—W. (W.) Eidson-Ton

**411. Selected Studies of Systems for Chronic Illness Care (3)**

Clinical activity—4 hours; discussion—4 hours. Prerequisite: course 400A, 400B, 400C, medical students with consent of instructor. Understanding of chronic illness, particularly diabetes, participation in patient care, alternative techniques. May be repeated one time for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Balsbaugh

**430. Family Medicine Clerkship (6-12)**

Clinical activity—45 hours; lecture—2 hours; workshop—2 hours. Prerequisite: approval by School of Medicine Committee on Student Progress. Family medicine clerkship for third year medical students. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Eidson-Ton, Srinivasan

**430FA. SJVP Longitudinal Primary Care Clerkship at UCSF Track 1 (4)**

Clinical activity—45 hours; lecture—2 hours; workshop—2 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks at UCSF Fresno. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only; deferred grading only, pending completion of sequence.)—S. (S.) Eidson-Ton, Srinivasan

**430FB. SJVP Longitudinal Primary Care Clerkship at UCSF Track 1 (4)**

Clinical activity—45 hours; lecture—2 hours; workshop—2 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks at UCSF Fresno. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only; deferred grading only, pending completion of sequence.)—Su. (Su.) Eidson-Ton, Srinivasan

**430FC. SJVP Longitudinal Primary Care Clerkship at UCSF Track 1 (4)**

Clinical activity—45 hours; lecture—2 hours; workshop—2 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks at UCSF Fresno. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only; deferred grading only, pending completion of sequence.)—F. (F.) Eidson-Ton, Srinivasan

**430FD. SJVP Longitudinal Primary Care Clerkship at UCSF Track 2 (4)**

Clinical activity—45 hours; lecture—2 hours; workshop—2 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks at UCSF Fresno. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only; deferred grading only, pending completion of sequence.)—F. (F.) Eidson-Ton, Srinivasan

**430FE. SJVP Longitudinal Primary Care Clerkship at UCSF Track 2 (4)**

Clinical activity—45 hours; lecture—2 hours; workshop—2 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of

instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks at UCSF Fresno. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only; deferred grading only, pending completion of sequence.)—W. (W.) Eidson-Ton, Srinivasan

**430FF. SJVP Longitudinal Primary Care Clerkship at UCSF Track 2 (4)**

Clinical activity—45 hours; lecture—2 hours; workshop—2 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks at UCSF Fresno. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only; deferred grading only, pending completion of sequence.)—S. (S.) Eidson-Ton, Srinivasan

**430K. ACE-PC Family Medicine Clerkship (6)**

Clinical activity—45 hours; lecture—2 hours; workshop—2 hours. Prerequisite: approval by School of Medicine Committee on Student Progress. Family medicine clerkship for ACE-PC Program. (H/P/F grading only.)—S. (S.) Eidson-Ton, Srinivasan

**430KA. ACE-PC Family Medicine Clerkship A (1.5)**

Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite: approval by School of Medicine Committee on Student Progress. Longitudinal family medicine clerkship for ACE-PC Program. (H/P/F grading only; deferred grading only, pending completion of sequence.)—Su. (Su.) Eidson-Ton, Srinivasan

**430KB. ACE-PC Family Medicine Clerkship B (1.5)**

Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite: approval by School of Medicine Committee on Student Progress. Longitudinal Family medicine clerkship for ACE-PC Program. (H/P/F grading only; deferred grading only, pending completion of sequence.)—F. (F.) Eidson-Ton, Srinivasan

**430KC. ACE-PC Family Medicine Clerkship C (1.5)**

Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite: approval by School of Medicine Committee on Student Progress. Longitudinal Family medicine clerkship for ACE-PC Program. (H/P/F grading only; deferred grading only, pending completion of sequence.)—W. (W.) Eidson-Ton, Srinivasan

**430KD. ACE-PC Family Medicine Clerkship D (1.5)**

Clinical Activity—45 hours; Lecture—2 hours; Workshop—2 hours. Prerequisite: approval by School of Medicine Committee on Student Progress. Longitudinal Family medicine clerkship for ACE-PC Program. (H/P/F grading only; deferred grading only, pending completion of sequence.)—S. (S.) Eidson-Ton, Srinivasan

**430R. Rural PRIME Family Medicine Clerkship (12)**

Clinical activity—45 hours; lecture—2 hours; workshop—2 hours. Eight week primary care clerkship for rural prime third year medical students. Eight weeks of family medicine training at a rural site. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Eidson-Ton

**430TA. TeachMS Longitudinal Primary Care Clerkship (A) (4)**

Clinical activity—45 hours; lecture—2 hours; workshop—2 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of instructor. Longitudinal Clerkship runs concurrently with Internal Medicine and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups,

rounds, conferences are required. (H/P/F grading only; deferred grading only, pending completion of sequence.)—F. (F.) Eidson-Ton

**430TB. TeachMS Longitudinal Primary Care Clerkship (B) (6)**

Clinical activity—45 hours; lecture—2 hours; workshop—2 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of instructor. Longitudinal Clerkship runs concurrently with Internal Medicine and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only; deferred grading only, pending completion of sequence.)—W. (W.) Eidson-Ton, Srinivasan

**430TC. TeachMS Longitudinal Primary Care Clerkship (C) (2)**

Clinical activity—45 hours; lecture—2 hours; workshop—2 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of instructor. Longitudinal Clerkship runs concurrently with Internal Medicine and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only; deferred grading only, pending completion of sequence.)—S. (S.) Eidson-Ton, Srinivasan

**431. Primary Care Continuity Clinic (1)**

Clinical activity—4 sessions; project—1 session. Prerequisite: completion of the Pre-Clinical Curriculum; consent of instructor. Longitudinal component of the third-year primary care curriculum. Student attends their clinic roughly 18 half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only.)—S. (S.) Eidson-Ton, Schwartz, Srinivasan

**431A. Primary Care Continuity Clinic (1)**

Clinical activity—4 sessions; project—1 session. Prerequisite: completion of the Pre-Clinical Curriculum; consent of instructor. Longitudinal component of the third-year primary care curriculum. Student attends their clinic roughly 18 half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only; deferred grading only, pending completion of sequence.)—Su. (Su.) Eidson-Ton, Schwartz, Srinivasan

**431B. Primary Care Continuity Clinic (1)**

Clinical activity—4 sessions; project—1 session. Prerequisite: completion of the Pre-Clinical Curriculum; consent of instructor. Longitudinal component of the third-year primary care curriculum. Student attends their clinic roughly 18 half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only; deferred grading only, pending completion of sequence.)—F. (F.) Eidson-Ton, Schwartz, Srinivasan

**431C. Primary Care Continuity Clinic (1)**

Clinical activity—4 sessions; project—1 session. Prerequisite: completion of the Pre-Clinical Curriculum; consent of instructor. Longitudinal component of the third-year primary care curriculum. Student attends their clinic roughly 18 half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only; deferred grading only, pending completion of sequence.)—W. (W.) Eidson-Ton, Schwartz, Srinivasan

**431D. Primary Care Continuity Clinic (1)**

Clinical activity—4 sessions; project—1 session. Prerequisite: completion of the Pre-Clinical Curriculum; consent of instructor. Longitudinal component of the third-year primary care curriculum. Student attends their clinic roughly 18 half-days over the course of the year, working one-on-one with a primary care preceptor. (H/P/F grading only; deferred grading only, pending completion of sequence.)—S. (S.) Eidson-Ton, Schwartz, Srinivasan

**434. Primary Care Clinics-Clinica Tepati (3-12)**

Clinical activity—32-36 hours; seminar—0-2 hours; lecture—1-2 hours. Open to medical students in all four years of medical school. Medical students will learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of

physician. Provides exposure to special health care needs of various ethnic and poverty-level populations. May be repeated for credit. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Hitzeman, Tu

#### **435. Primary Care Clinics-Imani Clinic (3-12)**

Clinical activity—32-36 hours; seminar—0-2 hours; lecture—1-2 hours. Open to medical students in all four years of medical school. Learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of physician. Provides exposure to special health care needs of various ethnic and poverty-level populations. May be repeated for credit. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Smith

#### **436. Continuity Clinic in Primary Care-Shifa Clinic (3-12)**

Clinical activity—32-36 hours; seminar—0-2 hours; lecture—1-2 hours. Open to medical students in all four years of medical school. Learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of physician. Provides exposure to special health care needs of various ethnic and poverty-level populations. May be repeated for credit. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Yasmeen

#### **437. Primary Care Clinics-Knights Landing (3)**

Clinical activity—2-3 hours; lecture—1 hour. Must complete an application and interview prior to registering. Learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of physician. Provides exposure to special health care needs of various ethnic and poverty-level populations in the community of Knights Landing. May be repeated for credit. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Eidson-Ton

#### **439D. Directed Clinical Studies in Family Medicine (1-12)**

Clinical activity—40 hours. Prerequisite: consent of instructor. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Eidson-Ton

#### **439R. Directed Studies in Family Medicine (1-12)**

Clinical activity—30 hours; independent study—10 hours. Prerequisite: consent of instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Eidson-Ton

#### **444. Advanced Preceptorship in Family Medicine (3-18)**

Clinical activity—40 hours. Prerequisite: completion of third-year primary care plus clerkship or consent of instructor. Open to medical students only. Preceptorships with primary care physicians in a variety of settings. Acquisition skills to evaluate and develop a treatment plan for patients with common medical problems seen by primary care physicians in an outpatient setting. May be repeated up to 18 units of credit. (H/P/F grading only.)—F, W, S, Su. Eidson-Ton

#### **450. CAM in Family & Community Health (3-18)**

Variable—20-40 hours. Intended to grant units for away rotations; not offered at the UC Davis Medical Center. Complementary and alternative medicine courses at away institutions that cover various aspects of integrative medicine, including but not limited to: botanicals, homeopathy, mind/body, naturopathy, nutrition, traditional Chinese medicine, osteopathy, and energy medicine. (H/P/F grading only.) Offered irregularly.—F, W, S, Su. (F, W, S, Su.) Eidson-Ton

#### **460. Geriatrics in Community Health (3-6)**

Fieldwork—24 hours; clinical activity—12 hours; lecture—4 hours. Prerequisite: course 430. Visits to community agencies including mental health teams, adult day health centers, a diagnostic and research center, and case management specialists. Observation and participation in MMSE's, patient-family conferences, interdisciplinary team meetings, neuropsychiatric testing and home visit evaluations. (H/P/F grading only.)—F, W, S, Su. Lin

#### **468. International Preceptorship (3-12)**

Clinical activity—40 hours. Prerequisite: medical student with consent of instructor. Preceptorship with a family practitioner in a foreign country (arranged by student contact or with assistance of the Family and Community Medicine Department.) Participate in clinical activities, analyze and report characteristics of the practice. May be repeated up to 12 units of credit. (H/P/F grading only.)—F, W, S, Su. Edison-Ton

#### **469. Inpatient Acting Internship in Family Medicine (3-12)**

Clinical activity—40 hours. Prerequisite: completion of third-year of medical school or consent of instructor. Open to medical students only. Comprehensive primary medical care of inpatients on a family medicine hospital service. Available sites are university-based family medicine residency programs and programs within the UC Davis Network of Affiliated Family Medicine Residency Programs. May be repeated up to 12 units of credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Eidson-Ton

#### **470. Inpatient Clinical Elective in Family Medicine (3-12)**

Clinical activity—40 hours. Prerequisite: completion of third-year of medical school or consent of instructor. Open to medical students only. Comprehensive primary medical care of patients on a family medicine hospital service. Usually includes inpatient and outpatient experience. May be repeated up to 12 units of credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Eidson-Ton

#### **475. Combined Inpatient/Outpatient Clinical Elective in Family Medicine (3-12)**

Clinical activity—40 hours. Prerequisite: completion of third-year of medical school or consent of instructor. Open to Medical students only. Combined inpatient and outpatient elective. Consists of comprehensive primary medical care of patients on a family medicine hospital service and in a family medicine outpatient clinic. May be repeated up to 12 units for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Eidson-Ton

#### **488. Selected Studies in Family Practice (1-9)**

Prerequisite: medical students with consent of instructor. Assigned readings in family practice to increase understanding on selected topics relating to family medicine and primary health care delivery; visits to and written analysis of selected health care programs; and/or exposure to family practice with a community physician preceptor who is a member of the clinical faculty. May be repeated up to 9 units of credit.—F, W, S, Su. Eidson-Ton

#### **490. Health Care to Underserved Populations (1)**

Lecture—1 hours. Prerequisite: Sociology, Political Science, or Applied Behavioral Science background recommended, or registration in medical school. Discusses sociocultural perspectives of underserved populations impacting health; roles of family/interpersonal relationships in making health care decisions; the nature of ethnic/racial/socioeconomic health care disparities; and clinicians' perspectives in treating people of cultures which are unfamiliar and/or uncomfortable with Western medicine. May be repeated for credit. (P/F grading only.)—F, W, (F, W.) Eidson-Ton, Nesbitt, Srinivasan

#### **493. Aging and Health (6)**

Seminar—12 hours. Prerequisite: consent of instructor. Is disease and infirmity the inevitable consequence of aging? We will spend four weeks exploring this question by reviewing the biology of

aging, physiologic changes seen in aged individuals and disease processes commonly found in elderly persons. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Lin

#### **495. LGBTIQQA Healthcare Lecture Series (1)**

Lecture—6 sessions. Increase the awareness of medical issues surrounding the LGBTIQQA community and arm students with knowledge of the health disparities the community faces. Provide better quality care to the LGBTIQQA patients cared for as physicians. May be repeated for credit. (P/F grading only.)—W. (W.) Callahan

#### **498. Directed Group Study (1-5)**

Variable—3-15 hours. Explore in-depth various topics in primary care. Extensive contact with and oversight by instructor. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Edison-Ton

#### **499. Research (1-12)**

Prerequisite: medical students with consent of instructor. Research in various aspects of the health care delivery system. (H/P/F grading only.)

#### **Human Physiology (HPH)**

##### **Lower Division**

###### **99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

##### **Upper Division**

###### **192. Internship in Human Physiology (1-12)**

Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in physiology and related fields. (P/NP grading only.)

###### **198. Directed Group Study (1-5)**

To be arranged. Prerequisite: consent of instructor. Directed reading, discussion and/or laboratory experience on selected topics. (P/NP grading only.)

###### **199. Special Study for Advanced Undergraduates (1-5)**

Laboratory—3-15 hours; undergraduate research project. Prerequisite: senior standing in biology, chemistry, physics, psychology, or engineering. (P/NP grading only.)

##### **Graduate**

###### **210A. Advanced Physiology (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Physiology Ph.D. program, or consent of instructor. Advanced course in general principles of physiology, surveying homeostasis, cellular and selected topics, and neurophysiology. (Same course as Physiology 210A.)—F. (F.) Payne

###### **298. Group Study (1-5)**

Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved.

###### **299. Research (1-12)**

Prerequisite: consent of instructor. (S/U grading only.)

##### **Professional**

###### **400. Human Physiology (6)**

Lecture—3 hours; laboratory—2 hours. Medical student only. General and cellular physiology of neurons, muscle, and epithelial cells and systemic physiology of cardiovascular, respiratory, gastrointestinal, and renal systems. (Deferred grading only, pending completion of sequence.) (P/F grading only.)—F, Su. (F, Su.) Ferns, Payne

###### **403. Medical Neuroanatomy (5)**

Lecture—3 hours; laboratory—1 hours; discussion/laboratory—1 hour. Prerequisite: Successful completion of course 400, block 1. Restricted to medical students only. Anatomy of the normal human nervous system, to include gross external and internal morphology of brain and spinal cord, and function neuroanatomy of motor, sensory and cognitive systems.

Incorporates application of neuroanatomy to clinical problem solving. (Same course as Cell Biology and Human Anatomy 403.) (P/F grading only.)—Su. (Su.) Blankenship, Gross

### **493. Physiological Principles in SICU SSM (6)**

Lecture—5 hours; lecture/laboratory—10 hours; laboratory—16 hours; clinical activity—4 hours. Prerequisite: consent of instructor. Restricted to UC Davis School of Medicine students only. Special Study Module, a four week course on the topic: Care of the Critically Ill Surgical Patient: Use of Physiological Principles to Guide Treatment of Patients with Common Surgical Problems. (Same course as Surgery 493C.) (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Cala, Holcroft

### **497T. Tutoring in Human Physiology (1-5)**

Tutoring—3-15 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (H/P/F grading only.)—Ferns, Payne

### **498. Directed Reading and Group Study (1-4)**

Discussion—2-8 hours. Prerequisite: medical student. Directed reading and discussion on selected topics in human physiology. (H/P/F grading only.)

### **499. Research (1-6)**

Prerequisite: medical students with consent of instructor. Laboratory investigation on selected topics. (H/P/F grading only.)

## **Internal Medicine (IMD)**

### **Lower Division**

#### **92. Internship (1-4)**

Internship—3-12 hours. Prerequisite: lower division standing and consent of instructor. Supervised internship in internal medicine and related fields. (P/NP grading only.)—Last

#### **98. Directed Group Study (1-2)**

Seminar—1-2 hours. Prerequisite: lower division standing and consent of instructor. Directed group study in medicine and related fields. (P/NP grading only.)—Last

#### **99. Undergraduate Research in Medicine: Molecular and Cell Biology (1-3)**

Prerequisite: consent of instructor. (P/NP grading only.)—Last

### **Upper Division**

#### **164. Practicum in Community Health Clinic: Bayanihan Clinic (1-2)**

Clinical activity—5 hours. Through active participation in the medical aspects of community health clinics, the undergraduate student gains knowledge of the organization, administration, and problem-solving capabilities. May be repeated for credit. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.) Guerrero

#### **192. Internship in Internal Medicine (1-12)**

Internship—3-36 hours; final report. Prerequisite: upper division standing. Supervised work experience in internal medicine and related fields. (P/NP grading only.)

#### **194. Practicum in Community Health Clinics (1-3)**

Clinical activity—5-15 hours on Saturday mornings and during the week as necessary, excluding holidays. Prerequisite: consent of instructor. The undergraduate student, through active participation in the medical aspects of community health clinics, gains knowledge of the organization, administration, and problem-solving capabilities of these primary care facilities. May be repeated for credit. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.) Kumagai

#### **198. Directed Group Study (1-2)**

Seminar—1-2 hours. Prerequisite: consent of instructor. Directed group study in medicine and related fields. (P/NP grading only.)—Last

### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

### **Graduate**

#### **214. Topics in Medical Ethics (1)**

Seminar—1 hour. The complex moral, legal, and ethical dilemmas that patients, families, and health care providers face in today's clinics. May be repeated one time for credit. (S/U grading only.)—F.

#### **220D. Cardiovascular System (2.5)**

Lecture/discussion—5.5 hours. Prerequisite: Human Physiology 200, graduate student status and consent of instructor. Principles of etiology, mechanisms, diagnosis and management of the major diseases of the cardiovascular system. Included are ischemic, valvular, hypertensive, cardiomyopathic, pericardial, and electrical disorders. (P/F grading only.)—W. (W.) Laslett

#### **250. Medicine and the Law (3)**

Lecture/discussion—2 hours; project—2 hours. Legal and bioethical principles and concepts in medicine. Topics include standard of care, informed consent, reproductive medicine, and end-of-life issues. (S/U grading only.)—W. Rich

#### **290C. Controversies in Clinical Research (1)**

Seminar—3 hours. Clinical Research Study design and data analysis related to controversial research areas. Presentations assigned to and given by faculty/student teams. May be repeated for credit. (S/U grading only.)—S. (S.) Lane, Meyers

### **Professional**

#### **414. One Health: A Course on Global Health (1)**

Conference—8 hours. Global health problems are complex and require culturally-sensitive, socially-acceptable, and action-oriented approaches to create practical and cost-effective solutions. Will examine major health problems created by the convergence of human, animal, and environmental influences. May be repeated for credit. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Wilkes

#### **416. Summer Institute on Race and Health (6)**

Independent study—30 hours. Prerequisite: consent of instructor. Limited enrollment. Using field trips, media, readings, and clinical experiences, 8-10 first year medical students will explore issues of race, health disparities and related issues in a 4 week institute during the summer break. (P/F grading only.)—W. (W.) Fancher, Fernandez, Garcia, Murray-Garcia

#### **420A. Hematology (2)**

Lecture/discussion—1 hour; discussion—1 hour. Prerequisite: consent of instructor. Restricted to Medical students only. Malignant disorders of blood cells and transfusion therapy. Covers acute leukemia, myelodysplasia, myeloproliferative disorders, lymphoma, and myeloma. (P/F grading only.)—F. (F.) O'Donnell

#### **420B. Gastrointestinal System (2.5)**

Lecture—2 hours; discussion—2 hours. Prerequisite: approval of Committee on Student Progress. Restricted to Medical students only. Basic pathophysiological principles of digestive diseases on which clinical concepts and judgments can be developed. Emphasis on pathophysiologic basis of gastroenterological and hepatic disorders with discussion of major disorders and their diagnosis and management. (P/F grading only.)—W. (W.) Terrado

#### **420C. Pulmonary & Critical Care Medicine (2.5)**

Laboratory/discussion—5.5 hours. Prerequisite: approval of SOM's Committee on Student Promotions. Restricted to Medical students only; student must pass all SOM Year 1 courses. Clinical aspects of respiratory anatomy, physiology, and pathology. Diagnostic procedures and a description of the major pulmonary diseases & disorders, and critical care medicine. (P/F grading only.)—F. (F.) Stollenwerk

### **420D. Cardiovascular System (2.5)**

Lecture/discussion—5.5 hours. Prerequisite: Approval of the School of Medicine Committee on Student Promotions. Restricted to Medical students only; student must pass all SOM Year 1 courses. Principles of etiology, mechanisms, diagnosis and management of the major diseases of the cardiovascular system. Included are ischemic, valvular, hypertensive, cardiomyopathic, pericardial, and electrical disorders. (P/F grading only.)—F. (F.) Venugopal

#### **420E. Nephrology (2)**

Lecture—2 hours; discussion—2 hours; laboratory—2 hours. Prerequisite: approval of Student Progress Committee. Fundamental aspects of disorders of body water, electrolytes and acid/base balance; major categories and mechanisms of parenchymal renal diseases; urinary tract infections. (P/F grading only.)—W. Yean

#### **430. Medicine Clerkship (12)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress. Clerkship is divided into two, four-week blocks, one each at UCDMC and at Kaiser Hospitals. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only.)—F, W, S, Su. Prescott

#### **430FA. SJVP Longitudinal Medicine Clerkship at UCSF Track 1 (4)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks at UCSF Fresno. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only; deferred grading only, pending completion of sequence.)—S. (S.) Aronowitz, Johl

#### **430FB. SJVP Longitudinal Medicine Clerkship at UCSF Track 1 (4)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks at UCSF Fresno. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only; deferred grading only, pending completion of sequence.)—Su. (Su.) Aronowitz, Johl

#### **430FC. SJVP Longitudinal Medicine Clerkship at UCSF Track 1 (4)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks at UCSF Fresno. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only; deferred grading only, pending completion of sequence.)—F. (F.) Aronowitz, Johl

#### **430FD. SJVP Longitudinal Medicine Clerkship at UCSF Track 2 (4)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks at UCSF Fresno. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only; deferred grading only, pending completion of sequence.)—F. (F.) Aronowitz, Johl

#### **430FE. SJVP Longitudinal Medicine Clerkship at UCSF Track 2 (4)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks at UCSF Fresno. Time is spent in direct patient care situations under the guidance of faculty.

On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only; deferred grading only, pending completion of sequence.) —W. (W.) Aronowitz, Johl

#### **430F. SJVP Longitudinal Medicine Clerkship at UCSF Track 2 (4)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks at UCSF Fresno. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only; deferred grading only, pending completion of sequence.) —S. (S.) Aronowitz, Johl

#### **430TA. TeachMS Longitudinal Medicine Clerkship (A) (4)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only; deferred grading only, pending completion of sequence.) —F. (F.) Aronowitz, Johl

#### **430TB. TeachMS Longitudinal Medicine Clerkship (B) (4)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only; deferred grading only, pending completion of sequence.) —W. (W.) Aronowitz, Johl

#### **430TC. TeachMS Longitudinal Medicine Clerkship (C) (2)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only; deferred grading only, pending completion of sequence.) —S. (S.) Aronowitz, Johl

#### **439D. Directed Clinical Studies in Internal Medicine (1-12)**

Clinical activity—40 hours. Prerequisite: consent of instructor. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.) —F, W, S, Su. (F, W, S, Su.)

#### **439R. Directed Studies in Internal Medicine (1-12)**

Clinical activity—30 hours; independent study—10 hours. Prerequisite: consent of instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.) —F, W, S, Su. (F, W, S, Su.)

#### **450A. Medicine and the Law (1.5)**

Seminar—2 hours; discussion—2 hours. Prerequisite: consent of instructor. Restricted to Medical students only. Legal and bioethical principles and concepts in medicine. Topics include standard of care, informed consent, reproductive medicine, and end-of-life issues. (Deferred grading only, pending completion of sequence. H/P/F grading only.) Offered irregularly.—W. (W.) Rich

#### **450B. Medicine and the Law (1.5)**

Seminar—2 hours; discussion—2 hours. Prerequisite: consent of instructor. Restricted to Medical students only. Legal and bioethical principles and concepts in medicine. Topics include standard of care, informed consent, reproductive medicine, and end-of-life issues. (Deferred grading only, pending completion of sequence. H/P/F grading only.) Offered irregularly.—S. (S.) Rich

#### **459. Oncology: Research and Treatment of Cancer (2)**

Lecture/discussion—2 hours. Prerequisite: second-, third-, or fourth-year medical student and/or consent of instructor. Comprehensive review of current treatment practices of cancer and state-of-the-art research impacting treatment and prevention of cancer. Emphasis on epidemiology, molecular biology, and pharmacology. (H/P/F grading only.) —F. (F.) DeGreggio

#### **460. Correctional Health Care Clerkship (1-4)**

Clinical activity—full time. Prerequisite: fourth-year medical student in good academic standing; consent of instructor. Covers Correctional Health delivery and the effects of detention and incarceration on health status. Special emphasis on problems unique to health care delivery in a prison setting. Student will spend time in clinical settings at three prison facilities. (H/P/F grading only.) —F, W, S, Su. (F, W, S, Su.) Silva

#### **461. Mather VA Internal Medicine AI (6)**

Clinical Activity—50 hours; lecture/discussion—5 hours; independent study—5 hours. Prerequisite: consent of instructor. Limited enrollment. Acting Internship in Internal Medicine for qualified 4th year Medical Students from the UC Davis School of Medicine at the Sacramento VA Hospital. Experiences will somewhat mirror those of AIs at UCDMC. May be repeated for credit. (H/P/F grading only.) —F, W, S, Su. (F, W, S, Su.) Jagadeesan, Tran

#### **462. Medicine Wards AI (6)**

Clinical activity—40 hours. Prerequisite: Medical Sciences 431; consent of instructor; demonstrated ability to accept responsibility. Limited enrollment. Assume role of acting intern and be primary physician on medical ward under direction of medical resident and staff. Teams I-V take call every fifth night. Emphasis on evidence-based inpatient care. May be repeated for credit. (H/P/F grading only.) —F, W, S, Su. (F, W, S, Su.) Johl

#### **463. Acting Internship in Medicine Intensive Care Unit (MICU) (3-6)**

Clinical activity—40 hours. Prerequisite: completion of third year in medical school; consent of Director of MICU. Limited enrollment. At UCDMC, student functions as acting intern on MICU service under direction of medical resident and staff. Responsibility for patients admitted to MICU. On call in hospital every fourth night. May be repeated for credit. (H/P/F grading only.) —F, W, S, Su. (F, W, S, Su.) Sandrock

#### **464. Bayanihan Primary Care Clinic (3)**

Clinical activity—6 hours. Prerequisite: consent of instructor. Restricted to medical students in all four years of medical school. Under the guidance and supervision of a physician, medical students will learn patient history taking, medical documentation, counseling, diagnosis and treatment of patients with chronic and acute disease. Provides exposure to the special needs of various ethnic and socioeconomic groups. May be repeated for credit. (P/F grading only.) —F, W, S, Su. (F, W, S, Su.) Guerrero

#### **465. Medicos-Global Health Sciences (9)**

Lecture—5 hours; clinical activity—25 hours; field-work—5 hours; project—5 hours. Prerequisite: consent of instructor; medical students only. Travel to foreign country for four weeks to collaborate with faculty from local universities and work in urban and rural environments, including hands-on experience with clinic patients. Cultural exchange and awareness of global health care. (P/F grading only.) —S. (Su.) Wilkes

#### **468. Ambulatory Internal Medicine Externship (3-18)**

Clinical activity—40 hours. Prerequisite: course 430; consent of instructor; demonstrated ability to accept responsibility. Limited enrollment. Hands-on primary care clinical experience in the ambulatory setting supervised by a general internist. Emphasis on evidence-based outpatient care. (H/P/F grading only.) —F, W, S, Su. (F, W, S, Su.) Henderson

#### **470. Landmark Clinical Trials and Evidence-Based Medicine (3)**

Lecture/discussion—10 hours; clinical activity—8 hours. Prerequisite: fourth-year medical student. Ten landmark clinical trials from a historical, clinical, and epidemiological/research perspective. Principles of evidence-based medicine. (H/P/F grading only.) —S. Kravitz, Amsterdam

#### **480. Person Centered Assessment (1)**

Lecture—1 hour. Prerequisite: open to all medical students. Person-centered assessment modalities and diagnostic approaches with regards to Internal Medicine and its different subspecialties. (P/F grading only.) —F. Fitzgerald

#### **494. Practicum in Community Health Clinics (1-3)**

Clinical activity—15-40 hours. Prerequisite: medical student with consent of instructor. Students are assigned to clinical settings that demonstrate ethnic, urban/rural, or other related aspects of clinical community health. Through active participation in health care delivery, students are able to relate conceptual with practical aspects of primary health care. May be repeated for credit. (H/P/F grading only.) —F, W, S. (F, W, S.) Kumagai

#### **497. Medicine, Bioethics and the Holocaust (3)**

Lecture/discussion—10 hours. Prerequisite: medical students only, consent of instructor. The concept of "evil" and the role of collaborators, bystanders and participants exemplified by the holocaust and compared to problems physicians face in practice today. Demonstration that evil emerges incrementally until taken for granted. (P/F grading only.) Offered irregularly.—F, W, S.

#### **498. Group Study in Internal Medicine (1-18)**

Prerequisite: consent of instructor. Special study for medical students which may involve laboratory or library research, ambulatory or inpatient care responsibility on campus, at UCDMC or off campus by specific arrangement. (H/P/F grading only.) —F, W, S, Su. (F, W, S, Su.)

#### **499. General Medicine Research (1-18)**

Independent study—20 hours. (H/P/F grading only.) —F, W, S, Su. (F, W, S, Su.) Meyers

### **Internal Medicine—Cardiology (CAR)**

#### **Upper Division**

#### **192. Internship in Cardiology (1-12)**

Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in cardiology. May be repeated for credit up to 12 units. (P/NP grading only.)

#### **199. Cardiology Research (1-5)**

Prerequisite: consent of instructor. Special study by individual arrangement in cardiovascular medicine. Work will include directed readings, laboratory and discussions. (P/NP grading only.)

#### **Graduate**

#### **220. Basic Science in Cardiology (1)**

Lecture—1 hour. Prerequisite: graduate or medical student status. Fundamentals underlying cardiovascular medicine. Including hemodynamics, neural control of the circulation, biochemistry and some experimental design and statistics. Experts in each of these fields will give current information in their areas. Offered in alternate years. (S/U grading only.) —S. Kaufman

**Professional****401. Clinical Cardiology Clerkship: Kaiser (3-18)**

Clinical activity—1.5 hours. Prerequisite: third- and fourth-year medical students with advance approval by Division of Cardiology. Limited enrollment. Emphasis placed on history taking and physical examination of pediatric and adult patients with congenital and acquired cardiovascular disease. Hospital rounds in CCU and elsewhere. Roles of ECG, PCG, and cardiac fluoroscopy, etc., in office cardiology will be evaluated. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**460. Cardiology Clinical Clerkship (3-18)**

Clinical activity—2-12 hours. Prerequisite: Internal Medicine 430, third- and fourth-year medical students in good academic standing with consent of instructor. Limited enrollment. Participation with members of subspecialty consultation service in initial clinical evaluation, work-up, management, and follow-up of patients with cardiologic disorders. Two outpatient clinics per week. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**461. Management of Coronary Artery Disease: Coronary Care Unit (3-18)**

Clinical activity. Prerequisite: completion of second year of medical school and advance approval by Division of Cardiology. Limited enrollment. Research in laboratory and exercise testing to be determined by instructor. Current methods of clinical research involving certain aspects of diagnosis and treatment. Includes acute coronary care, hemodynamic monitoring, stress testing, cardiac catheterization, pathologic correlations and the modern approach to therapy, both medical and surgical, based on pathophysiological mechanisms. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**464. Preventive Cardiology (3-6)**

Seminar—2 hours (for 2-4 weeks); clinical activity—full time (2-4 weeks). Prerequisite: completion of third year of medical school. Clinical experience, weekly seminar and reading on primary and secondary prevention of cardiovascular disease. Will be carried out in Lipid and Hypertension Clinics, Exercise Laboratory, Cardiac Care Unit, Cardiac Catheterization, and Cardiac Surgery services. (H/P/F grading only.)—W, S, Su. (W, S, Su.) Amsterdam

**480. Insights in Cardiology (1-3)**

Clinical activity—3-9 hours. Prerequisite: medical student in good academic standing and approval by Division of Cardiology. Students attend one or more cardiovascular medicine clinics: general, hypertension, arrhythmia. Introduction to the diagnosis/treatment of common cardiovascular problems. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**493. Gender Specific Medicine SSM (6)**

Lecture—5 hours; lecture/laboratory—10 hours; laboratory—16 hours; clinical activity—4 hours. Prerequisite: consent of instructor. UC Davis School of Medicine students only. Special Studies Module, a four week course on the topic: Basic Science Principles Relating to Gender Specific Medicine. (Same course as Obstetrics & Gynecology 493.) (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Sweet, Villalobos

**498. Special Group Study: EKG Unit (1-12)**

Prerequisite: medical student with advance approval by monthly attending faculty. Limited enrollment. Special group study in cardiology for medical students in EKG unit. May include lectures, directed reading, and/or discussion groups. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**499. Research (1-12)**

Prerequisite: approval by Division of Cardiology. (H/P/F grading only.)

**Internal Medicine—Endocrinology, Diabetes and Metabolism (ENM)****Upper Division****192. Internship in Endocrinology (1-12)**

Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in endocrinology. May be repeated for credit up to 12 units. (P/NP grading only.)

**Graduate****299. Research (1-12)**

Prerequisite: consent of instructor. Endocrinology research. (S/U grading only.)

**Professional****460. Endocrinology Clinical Clerkship (3-18)**

Clinical activity (inpatient-outpatient service)—full time (3 days per unit). Prerequisite: Internal Medicine 430 and/or consent of instructor. Limited enrollment. Participation with members of subspecialty service in the initial evaluation, work-up, management and follow-up of patients with endocrinologic disorders. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**465. Clinical Nutrition Clerkship (3-18)**

Clinical activity—30 hours. Prerequisite: completion of Internal Medicine 430; consent of IOR. In-depth experience in assessment and monitoring of nutritional support of patients whose illnesses are complicated by malnutrition and of patients with problems in under-nutrition due to various illnesses. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Prescott

**480. Insights in Endocrinology (1-3)**

Clinical activity—3-9 hours; oral presentation. Prerequisite: student in good academic standing and consent of instructor. First- or second-year students observe in morning Endocrine and Diabetes clinics and attend bi-weekly noon and afternoon endocrine conferences. They also give brief endocrine physiology oral presentation to the endocrine group. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**499. Research (1-12)**

Prerequisite: consent of instructor. (H/P/F grading only.)

**Internal Medicine—Gastroenterology (GAS)****Upper Division****192. Internship in Gastroenterology (1-12)**

Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in gastroenterology. May be repeated for credit up to 12 units. (P/NP grading only.)

**Graduate****299. Research (1-12)**

Research in gastroenterology. (S/U grading only.)

**Professional****460. Gastroenterology Clinical Clerkship (3-18)**

Clinical activity—30 hours. Prerequisite: completion of third year of medical school. Work-up, manage, and follow-up new patients on active inpatient consulting service. Gastroenterology/Hepatology patients. Daily rounds with attending physician. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Terrado

**480. Insights in Gastroenterology (1-3)**

Clinical activity—3-9 hours. Prerequisite: student in good academic standing and consent of instructor. To gain insight in clinical activities of Gastroenterology Division through attendance at any of the follow-

ing: endoscopic procedures, ward rounds, outpatient clinic, and G.I. grand rounds. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**499. Research (1-12)**

Clinical activity—varied. Prerequisite: medical student status; consent of instructor. Part-time participation in active clinical and basic research projects. Some will involve both patient care and relevant laboratory procedures. Basic research includes liver metabolism, cancer markers, porphyrias diet and cancer, folate metabolism. May be repeated for credit. (H/P/F grading only.)

**Internal Medicine—General Medicine (GMD)****Upper Division****192. Internship in General Medicine (1-12)**

Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in general medicine. May be repeated for credit up to 12 units. (P/NP grading only.)

**Graduate****291. Seminars in Human Health Services Research and Clinical Epidemiology (1)**

Seminar—1 hour. Critical review, evaluation, and discussion of research in health services and clinical epidemiology. Presentation of statistical, epidemiologic, and econometric methods. Students present their own research and critique the work of others. May be repeated for credit. (Same course as Epidemiology 291.) (S/U grading only.)—F, W, S. (F, W, S.)

**Professional****460. General Medicine Consults (1-18)**

Clinical activity (inpatient-outpatient service)—40 hours. Prerequisite: fourth-year medical students with consent of instructor; a general medicine clerkship. Limited enrollment. Supervised opportunity to see entire spectrum of medical problems encountered by a general internist. Student spends time in General Medicine Clinic and on the General Medicine Consult Service. Consultation Service is particularly concerned with medical evaluation of surgical patients. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Keenan

**470. Health Care Ethics (3-9)**

Lecture/discussion—2 hours; laboratory/discussion—1 hour. Prerequisite: consent of instructor. Guided independent study of issues in biomedical ethics, with discussion of readings that are based on student interests and needs. Participation in ethics rounds. (Same course as Nursing 470.) (S/U grading only.)—W, Su. (S, Su.)

**485. Introduction to Health Care Ethics (1)**

Lecture—10 weeks. Prerequisite: medical student in good standing. Introduction to concepts and methods of healthcare ethics. Emphasis on problems and methods. (H/P/F grading only.)—F. (F.)

**499. General Medicine Research (1-18)**

Discussion—3 hours; clinical research—8-40 hours. Prerequisite: consent of instructor. Student will be involved in a clinical research problem within the areas, interest and expertise of members of Division of General Internal Medicine. Alternatively, the research effort will be directed toward investigation of a clinical problem of general medical interest. May be repeated for credit. (H/P/F grading only.)

**Internal Medicine—Hematology-Oncology (HON)****Upper Division****199. Research in Hematology-Oncology (1-5)**

Laboratory—hours variable. Prerequisite: upper division standing and consent of instructor. Experience in laboratory research. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

**Graduate****298. Topics in Hematology (1-4)**

Prerequisite: one year of graduate work and/or consent of instructor. Basic concepts of the physiology of the hematopoietic organ, the pathophysiology of hematopoietic disease, and concepts of therapeutics will be offered for study. The specific topics to be dictated by the interest and background of the students.

**299. Research (1-12)**

Prerequisite: consent of instructor. Laboratory investigation contributing to the dissertation for a graduate degree. (S/U grading only.)

**Professional****420. Oncology (4)**

Lecture/discussion—2 hours. Prerequisite: approval by the SOM Committee on Student Promotions. Restricted to Medical student only; students must pass all Year 1 SOM courses. Covers the principles of oncology and the pathophysiology of specific, common cancers correlated with organ systems pathophysiology and systemic pathology courses. (P/F grading only.)—F, (F) Welborn

**460. Hematology-Oncology Acting Internship (6-18)**

Clinical activity. Prerequisite: fourth-year medical student in good academic standing. Limited enrollment. Acting intern on inpatient hematology/oncology ward service. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**461. Hematology-Oncology Consult Clerkship (6-12)**

Clinical activity. Prerequisite: fourth-year medical student in good academic standing. Limited enrollment. Student is an integral member of the inpatient hematology and oncology consult service, the bone marrow service, and will attend all conferences sponsored by the Division. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**462. Hematology-Oncology Ambulatory Clerkship (3-18)**

Clinical activity—30 hours. Prerequisite: fourth-year medical student in good academic standing; consent of instructor. Limited enrollment. Outpatient rotations in related clinics. Participation with members of the subspecialty service in the initial clinical evaluation, work-up, management and follow-up of the patient with hematologic or oncologic disorders. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**493. Cancer as a Process (1-6)**

Seminar—10 hours; clinical activity—14 hours; autotutorial—6 hours; independent study—10 hours. Prerequisite: consent on instructor. Restricted to UC Davis School of Medicine students only. Covers cancer as a process, beginning with risks and prevention, preneoplasia, microinvasion, treatment options, metastases and systemic therapy, pain medicine and palliative care, and cancer communication. Format includes traditional lectures, student-led case discussions, and problem-based learning. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Meyer, von Friederichs Fitzwater

**499. Research (1-12)**

Prerequisite: consent of instructor. (H/P/F grading only.)

**Internal Medicine—Infectious Diseases (IDI)****Upper Division****141. Infectious Diseases of Humans (1)**

Lecture—1 hour. Prerequisite: introductory knowledge in biology and chemistry recommended. Course integrates information on biological and molecular nature of the causative organism, modern diagnostics, treatment and prevention strategies, and the role of infectious diseases in contemporary society and throughout human history. (P/NP grading only.)—F, (F) Danekar

**192. Research Internship in Internal Medicine (1-12)**

Internship—3-36 hours; final report. Supervised work experience in the division of Infectious Diseases. Undergraduates will have an opportunity to acquire research experience in clinical settings. May be repeated for credit up to 12 units. (P/NP grading only.)

**199. Infectious Diseases Research (1-5)**

Prerequisite: chemistry through organic chemistry (in addition, physical and biochemistry preferred), biology through basic bacteriology (in addition, microbiology and immunology preferred); and consent of instructor. Discrete problem requiring reading and actual manual effort in solution will be assigned to each student. Progress and results will be reviewed at intervals with instructor and via seminar presentation. (P/NP grading only.)

**Graduate****211. Epidemiology and Prevention of Infectious Diseases (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: Epidemiology 205B, 207 or Internal Medicine 421. Infectious disease epidemiology and prevention, with equal emphasis on human and veterinary diseases. Major categories of infectious diseases by mode of transmission.—S. DeRiemer, Sandrock

**299. Research in Infectious Diseases (1-12)**

Prerequisite: consent of instructor. Laboratory investigation contributing to the dissertation for a graduate degree. (S/U grading only.)

**Professional****440. Introduction to AIDS and Related Disorders (1.5-6)**

Clinical Activity—30 hours; discussion—10 hours. Prerequisite: first and second year medical students must be in good academic standing and have consent from the instructor. Familiarizes students with the diagnosis and treatment of individuals infected with the human immunodeficiency virus. Students will interview patients, observe patient care and participate in ongoing clinic research as well as examine alternative lifestyles. May be repeated for credit. (H/P/F grading only.)—F, W, Su.

**450. Clinical and Social Care of the Injection Drug User (1-4)**

Lecture—1 hour; clinical activity—3 hours. Prerequisite: first and second year medical students in good academic standing. Lecture and guided clinical practice in a supervised clinical setting, focusing on the social and medical aspects of health care for injection drug users. May be repeated for credit up to 24 units. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**460. Infectious Diseases Clinical Clerkship (3-6)**

Clinical activity. Prerequisite: successful completion of two years of study in an accredited medical school. Limited enrollment with priority to fourth-year medical students. Patients ill with infectious diseases, including AIDS, will be evaluated and presented at rounds and case conferences. Patients are also seen in the Infectious Diseases Clinic. Instruction in clinical microbiology and the proper use of the laboratory will be provided. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Cohen

**499. Research Topics in Infectious Disease (2-12)**

Prerequisite: successful completion of the first year study in School of Medicine, graduate students (approved for graduate credit), and/or consent of instructor. Discrete problem requiring reading and actual manual effort in solution will be assigned to each student. Progress and results to be reviewed at intervals with instructor and via seminar presentation. (H/P/F grading only.)

**Internal Medicine—Nephrology (NEP)****Upper Division****192. Internship in Nephrology (1-12)**

Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in nephrology. May be repeated for credit up to 12 units. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

**Graduate****299. Nephrology Research (1-12)**

Prerequisite: consent of instructor. (S/U grading only.)

**Professional****444. Curriculum Design for Doctoring (1)**

Project—2 hours; seminar—1 hour. Prerequisite: consent of instructor; second year standing in School of Medicine. Design of Doctoring curriculum for medical students in focused topic areas to be announced annually. Students will design sessions, consider resource needs, and work with IORs to initiate the curriculum. (P/F grading only.)—Su. (Su.)

**460. Nephrology and Fluid Balance (3-6)**

Clinical activity—4 hours; Lecture/discussion—10 hours. Prerequisite: completion of 3rd year medical school; completion of Medicine Core Clerkship; consent of the instructor. Limited enrollment. Active participation in all inpatient/outpatient clinical activities, attendance at specific lectures and conferences at UCD Medical Center covering the field of nephrology and fluid-electrolyte disorders. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Yean

**499. Research in Nephrology (3-18)**

Prerequisite: individual arrangement and consent of instructor. Independent laboratory research on a specific problem related to biochemical or immunologic causes of renal disease and/or uremic disorders in humans or animals. (H/P/F grading only.)

**Internal Medicine—Pulmonary Medicine (PUL)****Upper Division****192. Internship in Pulmonary Medicine (1-12)**

Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in pulmonary medicine. May be repeated for credit up to 12 units. (P/NP grading only.)

**Graduate****299. Pulmonary Disease Research (1-12)**

Laboratory. Prerequisite: by arrangement only. Pulmonary disease research activity with focus in inhalation toxicity, oxidants or lung biochemistry, and cell and molecular biology. (S/U grading only.)—Cross

**Professional****460. Comprehensive Pulmonary Medicine Clerkship (3-6)**

Clinical activity—40 hours. Prerequisite: completion of second year of medical school and/or consent of instructor; completion of Internal Medicine Clerkship. Rotation intended to provide a comprehensive student education in Pulmonary Medicine. Students will participate in hands on clinical education, as well as completing an assigned curricula. Intended for students pursuing Internal Medicine & Primary Care careers. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Stollenwerk

**461. Critical Care Clinical Clerkship (3-6)**

Clinical activity—40 hours. Prerequisite: completion of second year of medical school and/or consent of instructor; completion of Internal Medicine and Surgical Clerkships. Rotation intended to provide student education in the Critical Care Management of

sub-specialty patients. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Stollenwerk

#### **462. Pulmonary Clinical Clerkship (3-6)**

Clinical activity—35 hours. Prerequisite: completion of second year of medical school and/or consent of instructor; completion of Internal Medicine Clerkship. Similar to course 460. Rotation designed for students interested in learning pulmonary medicine, but who desire more variety in their clerkships, and do not desire the comprehensive experience offered by a four-week pulmonary rotation. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Stollenwerk

#### **470. Practicum in Care of the Terminally Ill (3-6)**

Clinical activity—35 hours; seminar—5 hours. Prerequisite: consent of instructor. Restricted to fourth-year Medical students in good standing. Work with hospice interdisciplinary team. Direct experience in the care of patients with illnesses where no cure is possible. Emphasis on symptom relief, end of life issues, physician assisted suicide. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) McMillian

#### **475. Encounters in Ethics in the ICU (3-6)**

Clinical Activity—12 hours; lecture/discussion—6 hours; independent study—6 hours. Prerequisite: 4th year Medical Student. Care for critically ill adults with complex medical disease carries with it unique ethical roles and duties for the physician. (H/P/F grading only.)—F, W, S. (F, W, S.) Black

#### **480. Pulmonary-Critical Care Medicine Insights (1-3)**

Clinical activity—3-9 hours. Prerequisite: student in good academic standing; consent of instructor. Attend respiratory outpatient clinics and in-patient pulmonary consultation rounds and medical intensive care rounds. Introduction to diagnosis and treatment of common pulmonary problems. (H/P/F grading only.) Offered irregularly.—F, W, S, Su. (F, W, S, Su.) Stollenwerk

#### **499. Research (1-12)**

Prerequisite: consent of instructor. (H/P/F grading only.)

### **Internal Medicine—Rheumatology-Allergy (RAL)**

#### **Lower Division**

##### **99. Directed Research in Immunology (1-5)**

Laboratory. Prerequisite: consent of instructor. Independent research will be encouraged in basic immunology, including the role of the cellular immune system in oncogenesis. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **Upper Division**

##### **192. Internship in Rheumatology-Allergy (1-12)**

Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in rheumatology-allergy. May be repeated for credit up to 12 units. (P/NP grading only.)

##### **199. Directed Research in Immunology (1-5)**

Laboratory. Prerequisite: consent of instructor. Independent research will be encouraged in basic immunology, including the role of the cellular immune system in oncogenesis. (P/NP grading only.)

#### **Graduate**

##### **209. Current Topics in Immunology: From Presentations to Grants (3)**

Lecture—1 hour; term paper or discussion—1 hour; project—1 hour. Prerequisite: Immunology 201. Current developments in various aspects of immunology and their interrelationships. Focus on areas of immunology not currently covered in the basic and advanced immunology courses. Oral presentation, written review and grant preparation.—W. (W.) Van de Water

#### **298. Topics in Rheumatology and Clinical Immunology (1-5)**

Laboratory. Prerequisite: consent of instructor. Library and/or laboratory work as required. (S/U grading only.)—Gershwin

#### **299. Research in Autoimmune Disease (1-12)**

Laboratory. Prerequisite: consent of instructor. Independent research will be encouraged in both animal models of human disease (including congenitally athymic [nude], asplenic, and New Zealand mice) and the cellular immune system of patients with systemic lupus erythematosus, Sjögren's syndrome, polymyositis and drug hypersensitivity. (S/U grading only.)

#### **Professional**

##### **460. Rheumatology Clinical Clerkship (1-18)**

Clinical activity—2-40 hours. Prerequisite: Medical Sciences 431 and consent of instructor. Participation with members of the subspecialty service in the diagnosis and therapeutic management of patients with rheumatologic diseases. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

##### **461. Allergy Clinical Clerkship (3-18)**

Clinical activity (inpatient-outpatient service)—full time (2 to 12 weeks). Prerequisite: completion of second year of medical school and consent of instructor. Student will work with practicing allergist in daily work with patients and participate in weekly allergy clinic and teaching conferences. Study of the literature. Will see patients with problems in clinical immunology, immunodeficiency, asthma, allergic rhinitis. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

##### **480. Insights in Rheumatology (1-3)**

Clinical activity—3-9 hours. Prerequisite: student in good academic standing and consent of instructor. Participation in rheumatology consultation rounds, rheumatic disease clinics and conferences with supervised readings in rheumatology. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Leek

##### **499. Research (1-12)**

Prerequisite: medical student with consent of instructor. Part-time participation in active clinical and basic research projects which can involve both patient care and relevant laboratory procedures. Students can gain experience in clinical medicine and clinical investigation. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **Master of Public Health (MPH)**

The Department of Public Health Sciences offers the Master of Public Health (MPH) degree. The MPH degree is accredited by the Council on Education for Public Health. Students apply for admission through the Office of Graduate Studies. The following listing is all required core course work for the degree. Course descriptions are given under the individual course offerings. For Public Health Sciences courses, see the [Public Health Sciences \(SPH\)](#), on page 450.

#### **UNITS**

#### **Required Units for Master of Public Health**

Core courses .....	40
Added-competence selectives .....	6-11
Elective units.....	5-10

#### **Total units required for the degree .....56**

#### **Core coursework**

##### **Biostatistics**

Introduction to Health Science Statistics.....	4
Biostatistics for the Health Sciences .....	4
Public Health Informatics .....	2

##### **Epidemiology**

Principles of Epidemiology .....	4
----------------------------------	---

##### **Environmental Health Science**

Principles of Environmental Health Science.....	3
---	---

#### **Health Services Administration**

Health Services Administration .....	3
<b>Social and Behavioral Influences on Health</b>	
Social & Behavioral Aspects of Public Health .....	3
1 unit/quarter.....	4
Public Health Practicum.....	10
For more information about the Master of Public Health, see <a href="http://mph.ucdavis.edu/">http://mph.ucdavis.edu/</a> .	

#### **Medical Microbiology (MMI)**

#### **Upper Division**

##### **130. Medical Mycology (2)**

Lecture—2 hours. Prerequisite: a course in pathogenic microbiology and consent of instructor. Various aspects of pathogenic fungi, particularly affecting humans, will be discussed including epidemiology, pathogenesis and pathology, diagnosis and therapy. Offered in alternate years. (Same course as 430.)—W. Pappagianis

##### **188. Human Immunology (3)**

Lecture—3 hours. Prerequisite: undergraduate level introductory biology course. Human immune system and mechanisms of immunity. Basic components and function of immune system. Molecular basis of immune response; basic cellular and molecular mechanisms. Interactions between cells of immune system producing immune responses; regulating molecules.—S. (S.) Torres

##### **192. Internship in Medical Microbiology (1-12)**

Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work experience in medical microbiology and related fields. (P/NP grading only.)—F, W, S. (F, W, S.)

##### **194H. Senior Honors Project in Medical Microbiology and Immunology (5)**

Independent study—15 hours. Prerequisite: course 199 and consent of instructor. Project in research related to immunology of medically important viruses. Development of a hypothesis-driven project, performance of experimental protocols and preparation of graphical representation of original data. Requires oral and written presentation of research results. May be repeated three times for credit with consent of instructor. (P/NP grading only.)—F, W, S. (F, W, S.)

##### **198. Group Study in Medical Microbiology (1-5)**

Prerequisite: upper division standing and consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (P/NP grading only.)

##### **199. Research in Medical Microbiology (1-5)**

Prerequisite: upper division standing and consent of instructor. Individual research. (P/NP grading only.)

#### **Graduate**

##### **200D. Mechanisms for Microbial Interactions with Hosts (3)**

Lecture/discussion—3 hours. Prerequisite: Microbiology 200A or consent of instructor. Study of mechanisms involved in microbial interactions within a host environment. The following principles are basic to understanding these interactions: host recognition, invasion, competition and growth, and host defense.—W. (W.)

##### **210A. Critical Analysis of Contemporary Research on Animal Models of Human (1)**

Lecture/discussion—1 hour. Prerequisite: students funded by the Animal Models of Infectious Diseases Training Grant; consent of instructor. Limited enrollment. Topics will include diverse vertebrate and invertebrate models of human infectious diseases. May be repeated for credit. Offered in alternate years. (S/U grading only.)—W. Bevins, Solnick

**210B. Comparative Analysis of Animal Models of Human Infectious Diseases (1)**

Lecture/discussion—1 hour. Prerequisite: students funded by the Animal Models of Infectious Diseases Training Grant; others by consent of instructor. Limited enrollment. Compares the major vertebrate and invertebrate animal models that are used most commonly to study human infectious disease, including mouse, nonhuman primate, *Caenorhabditis elegans*, and *drosophila*. May be repeated for credit. Offered in alternate years. (S/U grading only.)—W. Bevins, Solnick

**215. Medical Parasitology (3)**

Lecture—1.5 hours; discussion—1.5 hours. Prerequisite: graduate student with consent of instructor. Epidemiology, pathogenesis, diagnostic methods and current literature discussion of protozoa, helminths and arthropods of medical importance. Offered in alternate years.—S. Luckhart

**280. The Endogenous Microbiota in Health and Disease (3)**

Lecture—3 hours. Prerequisite: graduate standing. Recent insights into the microbial communities inhabiting mucosal surfaces, and will discuss how the composition of these communities contributes to normal development, metabolism, education of the immune system, and disease susceptibility.—S. (S.) Baumler, Dandekar, Tsolis

**291. Seminar in Microbiology and Immunology (1)**

Seminar—1 hour. Restricted to students with upper division or graduate standing. Research seminars on current topics in microbiology and immunology. May be repeated for credit if topic differs. (S/U grading only.)—F, W, S. (F, W, S.) Sankaran, Torres

**298. Group Study in Medical Microbiology and Immunology (1-5)**

Prerequisite: consent of instructor; open to graduate students. Directed reading and discussion and/or laboratory investigation on selected topics. (Sections 1, 2, 4, 5; S/U grading only.)

**299. Research (1-12)**

Prerequisite: consent of instructor; open to graduate students. Laboratory investigation contributing to the dissertation for a graduate degree. (S/U grading only.)

**Professional****410. Physician Scientist Molecular Medicine Journal Club (1)**

Lecture—1 hour. Weekly seminars by students on research articles in current literature. Topics/articles to be selected by instructors to include a broad range of frontiers in biomedical literature. May be repeated for credit. (H/P/F grading only.)—F. (F.) Bevins

**430. Medical Mycology (2)**

Lecture—2 hours. Prerequisite: a course in pathogenic microbiology and consent of instructor. Various aspects of pathogenic fungi, particularly affecting humans, will be discussed including epidemiology, pathogenesis and pathology, diagnosis and therapy. Offered in alternate years. (Same course as 130.) (H/P/F grading only.)—W. Pappagianis

**480A. Medical Immunology (2.5)**

Lecture—2 hours; laboratory/discussion—0.5 hours. Restricted to Medical students only. Helping to understand the immune system, the nomenclature and functional significance of the tissues, cells, proteins and genes of the immune system, as well as the normal regulatory mechanisms and pathologic outcomes related to the immune response. (P/F grading only; deferred grading only, Hartigan-O'Conner, Shacklett, Torres, Teuber)

**480B. Medical Microbiology (5.5)**

Lecture—2.75 hours; laboratory/discussion—1 hour. Restricted to Medical students only. Discussion of the diseases caused by infectious agents includes their pathogenesis, clinical manifestations, diagnosis, treatment epidemiology and prevention. Covers the general properties of and diagnostic

techniques for bacteria, fungi and viruses. (P/F grading only; deferred grading only, pending completion of sequence.)—S. (S.) Luckhart, Mudryj, Tsolis

**497T. Tutoring in Medical Microbiology (1-5)**

Tutoring—3-15 hours. Prerequisite: appropriate preparation in subject matter and consent of instructor. Assist instructor by tutoring medical students in one of the departmental courses that is a component of the required curriculum of the School of Medicine. (H/P/F grading only.)

**498. Group Study in Medical Microbiology and Immunology (1-5)**

Prerequisite: medical students with consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (H/P/F grading only.)

**499. Research (1-12)**

Prerequisite: medical students with consent of instructor. (H/P/F grading only.)

**Medical Pharmacology and Toxicology (PHA)****Lower Division****92. Internship in Pharmacology (1-12)**

Internship—3-36 hours; final report. Prerequisite: lower division student with good academic standing; approval of project prior to period of internship. Supervised work experience in pharmacology and related fields. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5)**

Prerequisite: lower division standing. (P/NP grading only.)

**Upper Division****192. Internship in Pharmacology (1-12)**

Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work experience in pharmacology and related fields. (P/NP grading only.)

**198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.) Despa

**Graduate****205. Problem Solving in Pharmacology (1)**

Lecture/discussion—1 hour. Restricted to Graduate Students in Pharmacology and Toxicology, Chemistry and Clinical Research Graduate Groups; other students may be accepted with consent of instructor. Students will be introduced to a current biomedical problem that would benefit from a developing drug and will develop an experimental strategy for addressing the issue. Students will develop model systems for testing various classic and recent pharmacological approaches. May be repeated 12 times for credit. Course changes subjects every quarter; each course is unique and can be taken as often as desirable; certain students (Trainees of the Training Program in Pharmacological Sciences) must take course for at least three years.—F, W, S. (F, W, S.) Hell

**207. Drug Discovery and Development (3)**

Lecture/discussion—2 hours; extensive writing—1 hour. Prerequisite: course 201, an equivalent course in general pharmacology, or knowledge of basic pharmacology. Intended for graduate students in Pharmacology and Toxicology, Chemistry and Clinical Research Graduate Groups; other students, including undergraduates, may be accepted with consent of instructors. Survey of the process by which a drug is discovered, developed and made available to the public. Topics include drug identification and optimization, safety testing, clinical evaluation, regulatory issues, intellectual property,

formulation, and the global pharmaceutical industry. May be repeated for credit.—W. (W.) Horuk, Rogawski, Wulff

**208. Advanced Cardiac Physiology and Pharmacology (3)**

Lecture—2 hours; lecture/discussion—1 hour. Prerequisite: Pharmacology and Toxicology 201, Pharmacology and Toxicology 202, an equivalent course in general pharmacology or physiology (example, Biomedical Engineering 204), or knowledge of basic pharmacology/physiology. Open to graduate students from the Pharmacology and Toxicology, Molecular, Cellular and Integrated Physiology, Biomedical Engineering and Clinical Research Graduate Groups; other students (including undergraduates) may be accepted upon consultation with the instructors. Detailed characterization of the mechanisms involved in cardiac excitation-contraction coupling, alterations that occur in heart disease and pharmacological interventions. Topics include cardiac contractile apparatus, action potential, Ca cycling, excitation-transcription coupling, cardiac inotropy, heart failure and arrhythmias.—S. (S.) Bossuyt, Despa, Ripplinger

**225. Gene Therapy (3)**

Lecture/discussion—3 hours. Prerequisite: Genetics 201C, Molecular and Cellular Biology 214, or equivalent. Gene therapy from basic concepts to clinical applications. Topics include the human genome and genetic variation, genetic diseases, methods to manipulate gene expression, viral and non-viral delivery vectors, history and progress of gene therapy, case studies, and ethical issues. (Same course as Genetics 225.)—S. (S.) Anderson

**250. Functional Genomics: From Bench to Bedside (3)**

Lecture/discussion—3 hours. Prerequisite: Genetics 201C, Molecular and Cellular Biology 214, or equivalent. Functional genomics (how genetic variation and epigenomics affect gene expression), with an emphasis on clinical relevance and applications. Topics include genetic variation and human disease, cancer therapeutics, and biomarker discovery. (Same course as Genetics 250.)—S. (S.) Diaz, LaSalle, Segal

**291. Pharmacology Research Seminar Series (1)**

Seminar—1 hour; discussion—1 hour. Prerequisite: consent of instructor; upper division or graduate standing. Research seminars on current topics in Pharmacology. May be repeated for credit when topic differs. (S/U grading only.)—F, W, S. (F, W, S.) Wulff

**298. Group Study (1-5)**

Prerequisite: consent of instructor.

**299. Research (1-12)**

Prerequisite: consent of instructor. (S/U grading only.)

**Professional****400A. Pharmacology (2)**

Lecture—1 hour; discussion/laboratory—0.3 hours. Prerequisite: approval by School of Medicine Committee on Student Progress. Restricted to Medical student only. Principles in pharmacology, including pharmacokinetics, drug metabolism and the actions, uses and toxicities of the major classes of drugs. (Deferred grading only, pending completion of sequence. P/F grading only.)—F, S. (F, S.) Gelli, Wulff

**400B. Pharmacology (1.5)**

Lecture—1 hour; discussion—0.25 hours. Prerequisite: approval by the School of Medicine Committee on Student Progress; medical students only. Principles in pharmacology, including autonomic pharmacology, general anesthetics, neuropharmacology and sedative/hypnotics. (P/F grading only.)—Su. (Su.) Diaz

**400C. Pharmacology (3.5)**

Lecture—2 hours; discussion—0.5 hours. Prerequisite: Approval by School of Medicine Committee on Student Progress; medical student only; successful completion of courses 400A and 400B. Treatment

respiratory and cardiovascular disease, central nervous system drugs, GI, Toxicology and chemotherapy. Specific topics include: asthma, chronic obstructive pulmonary disease, hypertension, congestive heart failure, and the treatment of arrhythmias. Pain Management, depression, psychosis, acid reflux, IBS and toxicology. (H/P/F grading only; deferred grading only, pending completion of sequence.)—F, W. (F, W.) Clancy, Gelli

#### **445. Introduction to Integrative Medicine (1)**

Lecture/discussion—1 hour. Prerequisite: medical student in good standing. Basic principles of alternative medical systems (e.g., traditional Chinese, Ayurvedic, Tibetan), alternative practices (e.g., chiropractic, osteopathy, naturopathy, homeopathy, herbalism, guided imagery/meditation, massage therapy), and mind/body connection are presented as introduction to integrating alternative treatments into traditional medicinal practice. (H/P/F grading only.)—W. (W.) Diaz

#### **490. Seminar in Pharmacology for Medical Students (1)**

Seminar—1 hour. Prerequisite: consent of instructor. Seminar in pharmacology for medical students. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **497T. Tutoring in Pharmacology (1-5)**

Tutoring—3-15 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (H/P/F grading only.)

#### **498. Special Study for Medical Students (1-5)**

Lecture, directed reading, and/or discussion groups—3-15 hours. Prerequisite: consent of instructor. Special study in pharmacology for medical students. (H/P/F grading only.)

#### **499. Directed Research for Medical Students (1-12)**

Laboratory—3-36 hours. Prerequisite: consent of instructor. Directed research in pharmacology for medical students. (H/P/F grading only.)

### **Neurology (NEU)**

#### **Upper Division**

##### **199. Individual Special Study and Research (1-4)**

Prerequisite: consent of instructor. Individual special study in neurophysiology and biomedical engineering is offered to qualified students. Studies on psychophysics, single-unit electrophysiology and instrumentation are offered in Davis. (P/NP grading only.)

#### **Graduate**

##### **298. Group Study (1-5)**

Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved. (S/U grading only.)

##### **299. Individual Special Study and Research (1-12)**

Laboratory—3-36 hours. Prerequisite: consent of instructor. Individual special study and research in Neurophysiology and Biomedical engineering is offered at both Davis and Sacramento Medical Center. (S/U grading only.)

#### **Professional**

##### **420. Clinical Neurosciences (2)**

Lecture/discussion—1 hour; lecture—1.5 hours. Restricted to Medical Students only. Pathophysiology underlying neurological disorders, including disorders of development, muscle, nerve, cerebral circulation, metabolism, myelin, cortical function, movement, cerebrospinal fluid, autonomic function and special senses. Anatomical basis of clinical testing, nervous system infection, neoplasia and trauma. (P/F grading only.)—Su. (Su.) Brass, Wheelock, Shahlaie

#### **450. Clinical Neurology Clerkship (3-6)**

Clinical activity—24 hours; conference—12 hours; seminar—4 hours; independent study—10 hours. Prerequisite: open to all fourth year medical students and third year medical students with consent of instructor. Restricted to six students per rotation. Critical elements of neurological clinical skills (history & exam) and basic and clinical neurological concepts expected for general residency preparation. Active, didactic, experiential and independent learning to encourage maturation of general professional competencies. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Malhado-Chang

#### **452. Advanced Clinical Neurology (6)**

Clinical activity—full time (4 weeks). Prerequisite: completion of four-week Neurology selective and consent of instructor. Extension of basic Neurology clerkship. Designed for students with special interest in medical disorders of nervous system. By arrangement with department, student may serve as an acting intern. Principles of neurological differential diagnosis and therapeutics emphasized. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **455. Child Neurology (6)**

Clinical activity—full time (4 weeks). Prerequisite: satisfactory completion of Internal Medicine 430, Obstetrics and Gynecology 430, Pediatrics 430 and consent of instructor. Student exposed to children with disorders of the nervous system, both in outpatient and inpatient services. Cases presented to a member of full-time faculty who will discuss clinical findings, differential diagnosis, management and therapy. This course satisfies the fourth year neuroscience requirement. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Chang

#### **498NE. Group Study in Neurology (1-6)**

Prerequisite: medical students with consent of instructor. Directed readings and discussions with a comprehensive written examination at the end of course. (P/F grading only.)—F, W, S, Su.

#### **499. Research (1-12)**

Laboratory—2-24 hours. Prerequisite: consent of instructor. Approved for graduate degree credit. Laboratory investigation on selected topics. (H/P/F grading only for graduate and medical students.)

#### **Neurosurgery (NSU)**

#### **Upper Division**

##### **199. Special Study in Neurosurgery for Advanced Undergraduates (1-5)**

Prerequisite: advanced undergraduate standing with consent of instructor. Students may participate in ongoing neurosurgical projects or may pursue and design independent projects. (P/NP grading only.)

#### **Graduate**

##### **299. Neurosurgery Research (3-12)**

Prerequisite: graduate student with consent of instructor. Student may participate in ongoing neurosurgical projects or may pursue and design independent projects. (S/U grading only.)

#### **Professional**

##### **451. Neurosurgical Critical Care Clerkship (3)**

Clinical activity—full time (2 weeks). Prerequisite: third- or fourth-year medical student having completed a neurosurgical clerkship or consent of instructor. Students participate in the care of neurosurgical patients in the NSICU and in the admission and surgical management of patients admitted through the Emergency Room. (H/P/F grading only.)—F, W, S, (F, W, S.)

#### **455. Clinical Pediatric Neurosurgery (6)**

Clinical activity—full time (4 weeks). Prerequisite: third- or fourth-year medical students who have satisfactorily completed course 460; consent of instructor. Admission and follow-up of pediatric patients. Neurological history, examination, and diagnostic procedures are emphasized. Students will participate in surgical procedures and are required to attend all pediatric neurosurgery conferences. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Pang

#### **460. Clinical Neurosurgery (6-18)**

Clinical activity—full time (3 days per unit; 4 weeks minimum). Prerequisite: third- and fourth-year medical students; consent of instructor. Approved for graduate degree credit. Admission and follow-up of patients. Neurological history, examination and further diagnostic procedures emphasized. Students participate in meaningful aspects of surgical procedures and attend listed conferences, rounds, and seminars. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **464. Externship (6-18)**

Clinical activity—full time (4-12 weeks). Prerequisite: fourth-year medical student having completed a neurosurgical clerkship or consent of instructor. Clerkship in neurosurgery to be arranged at another institution with accredited residency program in neurosurgery under proper supervision. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **470. Advanced Clinical Neurosurgery (6-18)**

Clinical activity—full time (4-12 weeks). Prerequisite: fourth-year medical student in good academic standing. Student will function as acting intern on neurosurgery service. Admission and management of patients. Neurological history, examination, diagnostic procedures, and surgical management are emphasized. Students participate in meaningful aspects of surgical procedures and attend required conferences and rounds. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **480. Insights in Neurosurgery (1-3)**

Clinical activity—3 to 9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Observation of neurosurgical care in emergency room, operating room and hospital floors, including manner of treatment of a variety of chronic and acute neurological diseases. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **499. Neurosurgery Research (1-18)**

Prerequisite: medical student with consent of instructor. Student may participate in ongoing neurosurgical projects or may pursue and design independent projects. (H/P/F grading only.)

#### **Obstetrics and Gynecology (OBG)**

#### **Upper Division**

##### **192. Shifa Clinic/Student Volunteer (1)**

Conference—2 hours; clinical activity—6-8 hours; discussion—1-2 hours. Open to undergraduates only. Supervised work experience in obstetrics and gynecology. May be repeated up to three times for credit. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.) Yasmeen

##### **194. Shifa Clinic Student Volunteer (1)**

Conference—1 hours; clinical activity—6 hours. Prerequisite: consent of instructor; the applications will be available for students. Selection of students will be made by selection committee of medical students coordinators and the IOR. Attend clinic every third Sunday performing duties of receptionist, intake, translation, monitor. Students attend a meeting immediately after end of clinic. There is a mandatory Monday meeting with Clinic co-directors. Students are expected to participate on various committees. May be repeated three times for credit. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.) Yasmeen

##### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

##### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

#### **Graduate**

##### **220. Genetics of Reproduction (3)**

Lecture/discussion—3 hours. Introduction to genetics of mammalian reproduction for domestic species, species used in research, and the human. Mendelian and non-Mendelian modes of inheritance. Research paper. Offered in alternate years.—W. (W.)

**290. Current Topics in Research (1)**

Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Selected topics in reproductive biology. (S/U grading only.)—F, W, S, Su. (F, W, S, Su.)

**298. Group Study (1-5)**

Prerequisite: graduate standing; consent of instructor.

**299. Research (1-12)**

Prerequisite: graduate standing; consent of instructor. (S/U grading only.)

**Professional****430. Obstetrics and Gynecology Clerkship (12)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress. Obstetrics, gynecologic and gynecological oncology experience in the delivery room, operating room, clinics and wards at UCDMC and affiliated sites. Rounds, conferences, interactive student presentations and seminars ongoing. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Hou

**430F. SJVP OBGYN Clerkship at UCSF (12)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress. Obstetrics, gynecologic and gynecological oncology experience in the delivery room, operating room, clinics and wards at UCSF Fresno. Rounds, conferences, interactive student presentations and seminars ongoing. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Hou

**439D. Directed Clinical Studies in OBGYN (1-12)**

Clinical activity—40 hours. Prerequisite: consent of instructor. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**439R. Directed Studies in OBGYN (1-12)**

Clinical activity—30 hours; independent study—10 hours. Prerequisite: consent of instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**460. Away Clinical Elective in OBGYN (3-18)**

Clinical activity—30 hours. Prerequisite: third- or fourth-year medical student; course 430 or the equivalent; consent of instructor. Active participation in inpatient and/or outpatient care. Attendance at specified conferences; student-faculty member informal conferences. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**465. Away Acting Internship in OBGYN (3-18)**

Clinical activity—40 hours. Prerequisite: satisfactory completion of course 430 and other third-year core clerkships; consent of instructor. Work at the level of a sub intern in Inpatient and/or Outpatient settings. Students are expected to provide direct patient management. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**470. Gynecologic Oncology Acting Internship (3-18)**

Clinical activity—40 hours. Prerequisite: satisfactory completion of course 430 and the third-year core clerkships; consent of instructor. Four week elective primarily involves direct inpatient management of women on the UCDMC Gyn/Onc service. Students will be acting at the level of a sub-intern and will work under the supervision of house staff, fellows, and attendings. May be repeated up to 99 units for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Leiserowitz

**471. Ambulatory Gynecology and Obstetrics Elective (3-18)**

Clinical activity—35 hours. Prerequisite: third- or fourth-year Medical Student having successfully completed course 430; consent of instructor of record. Conduct examinations, present patients and discuss treatment regimens at the following ambulatory clinics: General Obstetrics & Gynecology, New and Return Obstetrics (including Post-Partum), High-Risk Obstetrics, Pre-Operative Clinic, and other sub-specialty clinics as assigned. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**472. Family Planning and Reproductive Health (1-6)**

Clinical activity—30 hours; seminar—5 hours. Prerequisite: course 430; consent of instructor. Elective that will focus on the Gynecologic Subspecialty of Family Planning. Counseling and provision of contraceptive methods, experience with pelvic ultrasounds, management of spontaneous, inevitable and induced abortion and postabortion care by both surgical and medical techniques are included. May be repeated for credit. (H/P/F grading only)—F, W, S, Su. (F, W, S, Su.) Hou

**475. Labor & Delivery Acting Internship (3-18)**

Clinical activity—40 hours. Prerequisite: satisfactory completion of course 430 and the third-year core clerkships; consent of instructor. Four week elective primarily involves direct inpatient management of women on the UCDMC L&D unit. Students will be acting at the level of a sub-intern and will work under the supervision of house staff, fellows, and attendings. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Finta

**480. The Birthing Process (1)**

Lecture/discussion—1 hour. Open only to UC Davis medical students. Training to assist in the birthing process as a Doula. Topics not covered in the summer course. (S/U grading only.)—F.

**493. Gender Specific Medicine SSM (6)**

Lecture—5 hours; lecture/laboratory—10 hours; laboratory—16 hours; clinical activity—4 hours. Prerequisite: consent of instructor. Restricted to UC Davis School of Medicine students only. Special Studies Module, a four week course on the topic: Basic Science Principles Relating to Gender Specific Medicine. (Same course as Cardiology 493.) (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Sweet, Villalobos

**494. Shifa Clinic (6)**

Clinical activity—8 hours. Prerequisite: medical student in good standing. Restricted to medical student only. Interaction with patients from multiple ethnic and cultural backgrounds under the direct supervision of a physician/preceptor. Women's health issues and primary care issues in a diverse mixed population. May be repeated up to three times for credit. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Yasmeen

**494A. Shifa Clinic (1)**

Clinical activity—8 hours. Prerequisite: Medical student in good standing; consent of instructor. Interaction with patients from multiple ethnic and cultural backgrounds under the direct supervision of a physician/preceptor. Women's health issues and primary care issues in a diverse mixed population. (H/P/F grading only; deferred grading only, pending completion of sequence.)—Su. (Su.) Yasmeen

**494C. Shifa Clinic (1)**

Clinical activity—8 hours. Prerequisite: Medical student in good standing; consent of instructor. Interaction with patients from multiple ethnic and cultural backgrounds under the direct supervision of a physician/preceptor. Women's health issues and primary care issues in a diverse mixed population. (H/P/F grading only; deferred grading only, pending completion of sequence.)—W. (W.) Yasmeen

**498. Group Study (1-5)**

Prerequisite: consent of instructor. Explore particular topics in-depth in Obstetrics and Gynecology. Extensive contact with and oversight by instructor. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**499. Research in Obstetrics and Gynecology (2-12)**

Clinical activity. Prerequisite: consent of instructor; fourth-year medical student. Research in Obstetrics and Gynecology arranged with instructor. May be repeated eight times for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**Ophthalmology (OPT)****Upper Division****192. Research Internship (1-12)**

Internship—3-36 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in ophthalmology research. Research staff in Ophthalmology have programs in cell biology, electron microscopy, biochemistry, immunology and visual psychophysics. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate****299. Basic Research in Visual Science (1-12)**

Prerequisite: consent of instructor. (S/U grading only.)

**Professional****442. Introduction to Ophthalmology (3)**

Clinical activity—40 hours. Prerequisite: third- or fourth-year Medical Student with consent of instructor; consent of adviser; completion of third-year clerkships in Medicine and Surgery; consult Course Coordinator. Ocular disease diagnosis and management relevant to the clinical practice of future primary care physicians and others. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Baik

**465. Advanced Subspecialty Ophthalmology (3-6)**

Clinical activity—40 hours. Prerequisite: Medical students who have completed Internal Medicine 430 in third or fourth year; consent of instructor. Participation in disciplines of neuro-ophthalmology/pediatric ophthalmology, diseases of the cornea and external eye, glaucoma and retina. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Baik

**498. Group Study (1-3)**

Prerequisite: medical students with consent of instructor. Directed reading and discussion. (H/P/F grading only.)

**499. Research in Ophthalmology (1-12)**

To be arranged—3-36 hours. Prerequisite: medical students with consent of instructor. Individual research on selected topics in optics and visual physiology, cornea and external disease. (H/P/F grading only.)

**Orthopaedic Surgery (OSU)****Lower Division****99. Special Studies for Undergraduates (1-4)**

Prerequisite: lower division standing and consent of instructor. (P/NP grading only.)

**Upper Division****199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

**Professional****421. The Musculoskeletal System (2.5)**

Lecture/discussion—4 hours; discussion—2 hours. Prerequisite: consent of committee on student progress. Restricted to Medical students only. Basic and clinical science of orthopaedic surgery and rheumatology. (P/NP grading only.)—F. (F.) Marder, Van-DenBogaerde

**428. Ambulatory and Emergency Room Orthopaedics (3-6)**

Clinical activity. Prerequisite: fourth-year medical student in good academic standing; consent of instructor. Introduction to general orthopaedic problems and trauma and their management in an outpatient environment, including the emergency room. Student will conduct orthopaedic examinations, present patients to staff rotating through trauma, hand, pediatrics, adult and foot clinics. Orthopaedic physical examination and interpretation of x-rays. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Eastman

**462. Community Preceptorship (3-6)**

Clinical activity. Prerequisite: fourth-year medical student in good academic standing; consent of instructor. Acquaints student with private practice of orthopaedics in the community setting. Opportunity to observe and assist private practitioners in office, emergency room, operating room and inpatient environment. Student must provide own transportation. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Bovill, Eastman

**464. Acting Internship (6)**

Clinical activity. Prerequisite: fourth-year medical student in good academic standing; consent of instructor. Rotation designed to increase basic knowledge of musculoskeletal abnormalities at clinical level. Attention focused on selective case material. For those students who demonstrate proficiency, responsibility will be similar to that of intern. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Eastman

**465. Externship in Advanced Orthopaedics (3-6)**

Clinical activity—40 hours. Prerequisite: fourth-year medical student in good academic standing and consent of instructor. Advanced Orthopaedic rotation done at an approved institution. Topics may include Trauma, Sports, Spine, Pediatrics, Joint and/or Foot/Ankle. Students are expected to perform at the level of an Intern. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**480. Insights in Orthopaedic Surgery (1-3)**

Clinical activity—3-9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Exposure to aims, methods and procedures in orthopaedic surgery via attendance at grand rounds, patient care conferences, and group discussions. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Szabo

**481. History of Medicine for Medical Students (1.5)**

Lecture/discussion—2.5 hours (for six weeks). Prerequisite: third- or fourth-year students in the School of Medicine or second-year students with consent of instructor. Overview of the history of medicine throughout the world to introduce medical students to landmark accomplishments and key figures in the development of health care and to provide an expanded philosophical perspective on the ever-changing field of modern medicine. (H/P/F grading only.)—F.

**499. Orthopaedics Research (1-12)**

Clinical activity—3 hours to full time (to be arranged with individual faculty). Prerequisite: third- or fourth-year medical student in good academic standing; consent of instructor. Laboratory or clinical investigation on selected topics. May be repeated for credit. (H/P/F grading only.)

**Otolaryngology (OTO)****Upper Division****192. Internship in Otolaryngology (1-12)**

Internship—3 to 36 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in otolaryngology and related fields. Final project report. (P/NP grading only.)

**199. Special Study in Otolaryngology for Advanced Undergraduates (1-5)**

Prerequisite: advanced undergraduate with consent of instructor. (P/NP grading only.)—F, W, S, Su.

**Graduate****290C. Research Conference in Otolaryngology (1)**

Lecture/discussion—1 hour. Prerequisite: graduate students; medical students; advanced undergraduates with consent of instructor. Presentation and discussion of faculty and student research in otolaryngology. (S/U grading only.)—F, W, (F, W.)

**291. Principles of Speech, Hearing and Equilibrium (3)**

Lecture/discussion—3 hours. Prerequisite: graduate students; medical students; advanced undergraduates with consent of instructor. Presentations by faculty and guest lecturers on anatomy, physiology, and behaviors involved in speech production, hearing, and equilibrium. Each student will be expected to make one class presentation. —(F, W, S, Su.)

**299. Individual Study in Otolaryngology for Advanced Graduate Students (1-12)**

Prerequisite: advanced graduate student with consent of instructor. (S/U grading only.)

**Professional****403. Basic Principles of Reconstructive Surgery (1)**

Lecture—four 2-hour sessions; laboratory—one 2-hour session (4 weeks). Prerequisite: third- or fourth-year medical student with consent of instructor. Formal presentations covering basic principles of reconstructive surgery, including wound healing, treatment of lacerations, skin and bone grafts, flaps, Z-plastics and revision of scars. Laboratory session utilizing animal tissues. —W. (W.)

**440. Otolaryngology Required Clerkship (3-9)**

Clinical activity—30 hours. Prerequisite: consent by Committee on Student Evaluation and Promotion. Provide fundamental knowledge of otorhinolaryngologic diagnosis and principles, develop facility with basic ENT instruments, provide an understanding of treatment for ear, nose and throat problems and provide knowledge of what patients should be referred for otorhinolaryngologic care. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Diaz

**450. Fourth Year Otolaryngology Elective (6)**

Clinical activity—35 hours; lecture—2 hours; film viewing—0.25 hours; discussion—1 hour. Prerequisite: third- or fourth-year medical student; consent of instructor. Participation in Otolaryngology Clinic and operating room. Evaluation and management of common Otolaryngologic diseases. (H/P/F grading only.)—(F, W, S, Su.) Diaz

**460. Clinical Otolaryngology Elective (3-18)**

Clinical activity—full time. Prerequisite: third- and fourth-year medical students with consent of instructor; open to graduate students. Approved for graduate degree credit. Total involvement in clinical activities of the department. (H/P/F grading only.)—(F, W, S, Su.) Diaz

**490. Journal Seminar (1)**

Lecture/discussion—10 hours total (course given three times per quarter). Prerequisite: fourth-year medical students with consent of instructor; open to graduate students. Approved for graduate degree credit. Monthly review of current otolaryngologic and related literature and recent advances. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**498. Individual or Group Study (1-5)**

Lecture/discussion—1-2 hours; laboratory—1-4 hours. Prerequisite: consent of instructor. Introduction to basic research in Otolaryngology. Lectures, discussion and laboratory study of sensory and motor systems. (H/P/F grading only.) Diaz

**499. Research (1-12)**

Prerequisite: medical students with consent of instructor; open to graduate students. Approved for graduate degree credit. Participation in ongoing projects. (H/P/F grading only.)

**Pathology (PMD)****Upper Division****192. Internship in Human Pathology (1-12)**

Internship—3-36 hours; final project report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in pathology and related fields. (P/NP grading only.)

**199. Special Study in Pathology for Advanced Undergraduates (1-5)**

Prerequisite: advanced undergraduates and consent of instructor. (P/NP grading only.)

**Graduate****290C. Research Group Conferences (1)**

Seminar—1 hour. Prerequisite: graduate level standing. Seminar. Topics on animal models of human disease and infectious diseases. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**298. Advanced Group Study (1-5)**

Prerequisite: consent of instructor.

**299. Research (1-12)**

Prerequisite: consent of instructor. (S/U grading only.)

**Professional****405. Brain Cutting Conference (1-4)**

Seminar—1-4 hours. Prerequisite: third- and fourth-year medical students or consent of instructor. Current specimens are sectioned, discussed, and clinical correlations proposed. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Ellis

**407. Advanced Neuropathology (3-18)**

Lecture/discussion—40 hours. Prerequisite: third- or fourth-year medical student; consent of instructor. Restricted to Medical students only. Presents an integrated introduction to mechanisms of the central and peripheral nervous system injury. Gain an understanding of pathological mechanisms underlying disease, the anatomic and molecular manifestations of pathologic processes of the CNS and PNS. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Lechpammer

**410A. General and Endocrine Pathology (2.5)**

Lecture—4 hours; laboratory/discussion—4.5 hours. Restricted to Medical students only. Pathologic mechanisms of human disease. Concepts of general pathologic processes, i.e., cell death, inflammation and neoplasia. Endocrine pathology in the context of clinical human disease. Emphasis on integration of clinical practice with gross and histologic images emphasizing team-based learning. (P/F grading only.)—W. (W.) Olson

**410B. Systemic Pathology (1)**

Lecture—1 hours; laboratory/discussion—0.5 hours. Prerequisite: Approval by SOM Committee on Student Progress. Restricted to Medical students only. Anatomic and clinical pathology of organ system human disease with an emphasis on integration with clinical medicine. Topics include hematopathology and neuropathology. (Deferred grading only, pending completion of sequence. P/F grading only.)—Su. (Su.) Olson

**410C. Systemic Pathology (2)**

Lecture—1 hour; discussion—2 hours. Prerequisite: approval by SOM Committee on Student Progress. Restricted to Medical students only. Anatomic and clinical pathology of organ system human disease with an emphasis on integration with clinical medicine. Topics include pulmonary pathology, cardiovascular pathology, hematopathology, oncologic pathology, and nephropathology. (Deferred grading only, pending completion of sequence. P/F grading only.)—F. (F.) Olson

**410D. Systemic Pathology (2.5)**

Lecture—1 hour; discussion—2 hours. Prerequisite: approval by SOM Committee on Student Progress. Restricted to Medical students only. Anatomic and clinical pathology of organ system human disease with emphasis on integration with clinical medicine.

Course content parallels concurrent clinical courses with integration of lectures and discussions. Topics include gastrointestinal and gynecologic pathology, hepatopathology, oncologic pathology and musculoskeletal pathology. (Deferred grading only, pending completion of sequence. P/F grading only.)—W. (W.) Olson

#### **435. Clinical Patient Care in Pathology (3-9)**

Clinical activity—24 hours; independent study—7 hours; lecture/discussion—4 hours. Prerequisite: completed one of the following 3rd year clerkships: Family Medicine, Internal Medicine, Surgery, OBGYN or Pediatrics; consent of instructor. Four-week course is designed to give the third-year medical student an exposure to the diverse roles that pathologists have in clinical patient care. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Dwyre

#### **440. Surgery-Pathology-Radiology (SPR) Research Laboratory (2)**

Lecture/discussion—1 hour; laboratory/discussion—2 hours. Provide future clinicians and scientists with basic clinical and bioengineering laboratory skills to prepare for careers in translational research. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Tran, Wang

#### **464. Anatomic Pathology (3-6)**

Clinical activity—40 hours. Prerequisite: fourth-year Medical Students; consent of instructor. Restricted to Medical Students only. Anatomic pathology with an emphasis on autopsy and surgical pathology with application to clinical practice. Specimen grossing, frozen sections, microscopic sign-out and conferences. Exposure to cytopathology, hematopathology, and clinical pathology is available. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Bishop

#### **465. Applied Clinical Laboratory Medicine (3-6)**

Prerequisite: consent of instructor. Emphasis upon laboratory techniques, procedures, and interpretation of laboratory results. Students will be expected to participate fully and in all laboratory operations including bench techniques, laboratory management, and quality control. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Jensen

#### **470. Sub-Specialty in Didactic Pathology (3-16)**

Lecture/laboratory—25 hours. Prerequisite: consent of instructor. Externship provides in-depth exposure to one of a variety of subspecialties in Pathology. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Gandour-Edwards

#### **474. Anatomic Pathology Acting Internship (6)**

Clinical activity—40-80 hours. Prerequisite: fourth-year medical student or consent of instructor. Restricted to medical students only. Anatomic Pathology AI will permit students to gain skills needed for first year Pathology Residency. Students will perform autopsies and take full responsibility for a variety of surgical pathology cases. A mix of outpatient and inpatient cases is expected. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Bishop

#### **475. Anatomic Pathology Acting Internship (3-9)**

Clinical activity—40-80 hours. Prerequisite: completion of course 410 series or equivalent; successful completion of third-year clinical rotations; consent of instructor. Restricted to Medical Students only. Year four level course is designed to provide a concentrated experience in Surgical Pathology and Cytopathology. Rotate on the surgical and cytopathology sub-specialty teams and assume responsibility for patient cases. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Huang

#### **493. Interdisciplinary Study of Gastrointestinal Cancer (6)**

Lecture—5 hours; clinical activity—12 hours; laboratory—3 hours; discussion/laboratory—20 hours. Prerequisite: consent of instructor. In-depth study of gastrointestinal, hepatic and pancreatic cancer. Emphasis on an integration of basic science and

clinical medicine. Participating departments include pathology, surgical oncology, medical oncology, gastroenterology, radiology and radiotherapy. (Same course as Surgery 493D.) (H/P/F grading only.)—F, S. (F, S.) Khatri, Olson

#### **497T. Tutoring in Pathology (1-5)**

Tutoring—3-15 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (H/P/F grading only.)

#### **498. Advanced Group Study (1-5)**

Prerequisite: medical student and consent of instructor. Group study in variety of advanced topics in general, special, experimental, or comparative pathology. (H/P/F grading only.)

#### **499. Research (1-18)**

Prerequisite: medical student; consent of instructor. Limited enrollment. Research in experimental, molecular, comparative, and applied pathology. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **Pediatrics (PED)**

##### **Upper Division**

#### **199. Special Study in Pediatric Research (1-5)**

Prerequisite: undergraduate student with consent of instructor based upon adequate preparation as determined by instructor. (P/NP grading only.)

#### **Graduate**

#### **299. Pediatric Research (1-12)**

Prerequisite: graduate students who are candidates for a degree in some area of biology or behavioral sciences; consent of instructor. (S/U grading only.)

#### **Professional**

#### **401. Preceptorship in Pediatrics (2)**

Preceptorship—half time. Prerequisite: second-year medical student or first-year medical student with consent of instructor. Opportunity to observe and participate in primary medical care in a practicing pediatrician's office. Participation in history-taking and physical examination will be at discretion of preceptor and dependent on student's experience. Evaluation by student. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **402. Clinical Experience in Private Practice (1-18)**

Clinical activity—full time (2 to 12 weeks). Prerequisite: third-or fourth-year medical student; course 430; consent of preceptor and Chairperson. Opportunity to participate in practice of preceptor, performing such tasks as history taking, physical examination, and patient management. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **405. Pediatrics Lecture Series (0.5)**

Lecture—15 sessions. Prerequisite: consent of instructor. Lecture series covers major topics in pediatrics with case presentations and panels from pediatric subspecialists. Topics include, but are not limited to: cardiology, pulmonology, nephrology, gastroenterology, critical care, and primary care pediatrics. May be repeated for credit.—F. (F.) Gross

#### **415. Fetal and Neonatal Physiology (1)**

Lecture/discussion—4 hours; independent study—4 hours. Prerequisite: consent of instructor. Elective is designed to combine for study a variety of aspects of the physiology, anatomy and biochemistry of the fetus and newborn with relevant clinical examples of disorders in each of the 10 topics that will be discussed. (P/F grading only.)—S. (S.) Philipps, Subramanian

#### **430. Pediatric Clerkship (12)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress. Restricted to Medical students only. Eight week clinical clerkship providing students with the opportunity to learn fundamentals of caring for the pediatric patient by participating in nursery, ambulatory and inpatient services at UCDMC and affiliated clinical

sites. Rounds, conferences, student presentations ongoing. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Butani, Plant

#### **430F. SJVP Pediatric Clerkship at UCSF (12)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress. Restricted to Medical students only. Eight-week clinical clerkship providing students with the opportunity to learn fundamentals of caring for the pediatric patient by participating in nursery, ambulatory and inpatient services at UCSF Fresno. Rounds, conferences, student presentations ongoing. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Butani, Plant

#### **439D. Directed Clinical Studies in Pediatrics (1-12)**

Clinical activity—40 hours. Prerequisite: consent of instructor. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **439R. Directed Studies in Pediatrics (1-12)**

Clinical activity—30 hours; independent study—10 hours. Prerequisite: consent of instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **460A. Acting Internship: General Inpatient Pediatric Clerkship (6-18)**

Clinical activity—full time (4 to 12 weeks). Prerequisite: completion of course 430 with grade of B or better; letter of recommendation from Pediatrics faculty member. Limited enrollment. The Ward Acting Intern functions in a manner similar to that of a pediatric intern. The Acting Intern takes admissions in the regular sequence and is expected to take night call. The Acting Intern can expect to manage between six and ten patients at a time. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Kim

#### **460B. Acting Internship: Outpatient Pediatrics (3-18)**

Clinical activity—full time (2 to 12 weeks). Prerequisite: completion of course 430 with grade of B or better; letter of recommendation from Pediatrics faculty member. Limited enrollment. Supervised experience in pediatric care on outpatient service at UCDMC. Student functions as "Acting Intern" with appropriate supervision by residents and attending faculty. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Palmer

#### **461. Pediatric Inpatient AI in Hematology/Oncology (6)**

Clinical activity—37.5 hours; lecture—7.5 hours. Prerequisite: satisfactory completion of course 430; consent of instructor. Limited enrollment. Inpatient and outpatient experience in diagnosis and management of oncologic and hematologic disorders in children. Laboratory experience and participation in clinical investigation may be arranged. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Pawar

#### **462. Elective in Pediatric Endocrinology (3-18)**

Clinical activity—full time (2 to 12 weeks). Prerequisite: completion of course 430 with grade of B or better; letter of recommendation from Pediatrics faculty member; consent of instructor. Limited enrollment. Inpatient and outpatient experience in diagnosis and management of endocrine disorders in children. Laboratory experience and participation in clinical investigation may be arranged. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Styne

#### **463. Medical and Mental Health Evaluation of Children at Risk for Maltreatment (3-9)**

Clinical activity—30 hours; discussion—4 hours. Elective for fourth-year medical students covers basic areas of knowledge needed for child abuse prevention and consultation. Rotation includes legal cases, abuse exams, child and parent interactive therapy

and visits to community organizations. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Coulter, Urquiza

#### **464. Acting Internship in Neonatology (6-18)**

Clinical activity—full time (4 to 12 weeks). Prerequisite: completion of course 430 with grade of B or better; letter of recommendation from Pediatrics faculty member. Limited enrollment. Diagnostic and therapeutic aspect of the medical and surgical high-risk neonate. Student expected to take night call. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Chan

#### **465. Pediatric Specialty Clinic Elective (3-18)**

Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of course 430; consent of instructor. Limited enrollment. Supervised experience in a variety of pediatric subspecialty clinics. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **466. Elective in Pediatric Cardiology (3-18)**

Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of course 430. Inpatient and outpatient experience in diagnosis and management of cardiologic disorders in children. Laboratory experience and participation in clinical investigation may be arranged. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Berger

#### **467. Elective in Pulmonary Medicine (3-18)**

Clinical activity—full time (2 to 12 weeks); daily rounds, two weekly half-day clinics. Prerequisite: pediatric clerkship. Inpatient and outpatient management of pediatric patients with pulmonary diseases. These will include but will not be limited to cystic fibrosis, asthma, and other forms of chronic pulmonary diseases as well as congenital abnormalities. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Jhawar

#### **468. Elective in Pediatric Nephrology (3-18)**

Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of course 430; consent of instructor. Limited enrollment. Inpatient and outpatient experience in diagnosis and management of renal disorders in children. Laboratory experience and participation in clinical investigation may be arranged. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Butani

#### **469. Elective in Pediatric Infectious Disease (3-18)**

Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of course 430; consent of instructor. Limited enrollment. Inpatient and outpatient experience in diagnosis and treatment of infectious disease of infants and children. Laboratory and clinical investigation may be arranged. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Blumberg

#### **470. Elective in Pediatric Neurology (3-18)**

Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of course 430, Internal Medicine 430, Obstetrics and Gynecology 430, and Pediatrics 430 and consent of instructor. Limited enrollment. Inpatient and outpatient experience in diagnosis and management of neurological disorders in children. Students will also participate in other pediatric subspecialty clinics which serve children with neurological disorders. This course does not satisfy the fourth year neurology requirement. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Chang

#### **471. Elective in Pediatric Gastroenterology (3-18)**

Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of course 430; consent of instructor. Limited enrollment. Inpatient and outpatient experience in diagnosis and management of gastroenterology disorders in children. Laboratory experience and participation in clinical investigation may be arranged. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Kawatu

#### **472. Clinical Rotation in Adolescent Medicine (3-9)**

Clinical activity—39 hours; lecture—1 hour. Prerequisite: fourth year Medical Student; consent of instructor. Under supervision, students will see patients in the UCD clinic and at a number of community-based sites. Emphasis on the socially-mediated problems that face adolescents, including substance abuse, STD's, pregnancy, depression and suicide. One hour of lecture each week. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Wilkes

#### **473. Away Acting Internship in Pediatrics (6-18)**

Clinical activity—40 hours; lecture—6 hours. Prerequisite: satisfactory completion of Pediatrics Clerkship; consent of instructor. Work at the level of a sub intern in Inpatient and/or Outpatient settings. Expectation is to provide direct patient management. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Butani

#### **476. Acting Internship in Pediatric Intensive Care (6-18)**

Clinical activity—full time (4 to 12 weeks). Prerequisite: completion of course 430 with grade of A or consent of instructor of record; letter of recommendation from Pediatrics faculty member. Limited enrollment. Evaluation and support of critically ill infants and children. In general, student expected to take night call every third night during rotation. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Plant

#### **493. Ethical, Legal and Social Issues in Clinical Genetics (6)**

Seminar—12 hours; clinical activity—18 hours; autotutorial—8 hours; independent study—2 hours. Prerequisite: consent of instructor. Restricted to UC Davis School of Medicine students only. Develop advanced knowledge, communication skills and attitudes necessary to provide compassionate, knowledgeable, and expert care to patients who may be at increased genetic risk for disease. Seminars cover ethical and legal principles, epidemiology, and genetics. (H/P/F grading only.)—W. (W.) Rich, Wilkes

#### **493B. Living with Intellectual & Developmental Disability in the Community (1-6)**

Clinical activity—4 hours; lecture—10 hours; fieldwork—4 hours; seminar—4 hours. Prerequisite: consent of instructor. In-depth experience with Intellectual & Developmental Disability across the lifespan. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Hansen

#### **493C. Fetal and Neonatal Physiology SSM (6)**

Lecture/discussion—24 hours; clinical activity—8 hours. Prerequisite: consent of instructor. Elective is available for students interested in exploring the fascinating world of the fetus and neonate. The elective is designed to combine the basic sciences with relevant clinical examples of disorders. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Chan, Philipp, Tache

#### **498. Directed Group Study (1-5)**

Variable—3-15 hours. Explore in-depth various topics in Pediatrics. Extensive contact with and oversight by instructor. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **499. Research Topics in Pediatrics (1-18)**

Prerequisite: student in Medical School with consent of instructor. Individual research project in pediatric subspecialty areas (cardiology, endocrinology, hematology, metabolism, newborn physiology and others) may be arranged with faculty member. Independent research by student will be emphasized and long-term projects are possible. (H/P/F grading only.)

#### **Physical Medicine and Rehabilitation (PMR)**

##### **Upper Division**

#### **100. Research Approaches to Disability and Rehabilitation (2)**

Lecture/discussion—2 hours. Discussion and evaluation of research approaches to medical rehabilitation, community integration, and quality of life of disabled persons, with a focus on the progressive disabilities associated with neuromuscular diseases. Intent is to encourage interest in professions that serve the disabled community and increase awareness of rehabilitation goals.—W.

#### **198. Directed Group Study (1-5)**

Prerequisite: advanced standing and consent of instructor. (P/NP grading only.)

#### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: advanced standing and consent of instructor. (P/NP grading only.)

##### **Graduate**

#### **299. Research (1-12)**

Prerequisite: consent of instructor. (S/U grading only.)

##### **Professional**

#### **405. Healthy Living: Leading by Example (1.5)**

Lecture—4 sessions; discussion—2 sessions; laboratory—4 sessions; clinical activity—1 session. Prerequisite: consent of instructor. Course is to improve the physical and mental health of participating students while supplementing their medical education with specific concepts. May be repeated for credit. (P/F grading only.)—F. (F.) Gerrit

#### **405A. Healthy Living: Leading by Example (1)**

Lecture—4 sessions; discussion—2 sessions; laboratory—4 sessions; clinical activity—1 session. Prerequisite: consent of instructor. Improve the physical and mental health of participating students while supplementing their medical education with specific concepts. May be repeated for credit. (P/F grading only; deferred grading only, pending completion of sequence.)—F. (F.) Gerrit

#### **405B. Healthy Living: Leading by Example (0.5)**

Lecture—4 sessions; discussion—2 sessions; laboratory—4 sessions; clinical activity—1 session. Prerequisite: consent of instructor. Improve the physical and mental health of participating students while supplementing their medical education with specific concepts. May be repeated for credit. (P/F grading only; deferred grading only, pending completion of sequence.)—W. (W.) Gerrit

#### **440. Rehabilitation Medicine Clerkship (3)**

Clinical activity—36 hours; lecture/discussion—4 hours. Prerequisite: consent of instructor; completion of Internal Medicine 430, Surgery 430. Rehabilitation and comprehensive care of physically disabled and physical medicine management of neurologic, neuromuscular and musculoskeletal disorders. Emphasis on evaluation and conservative treatment of spinal disorders, sports injuries and neuromuscular disease. Emphasis on inpatient rehabilitation, pediatrics, spine or sports possible. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Spalding-Dias

#### **461. Rehabilitation Medicine (6)**

Clinical activity—36 hours; lecture/discussion—4 hours. Prerequisite: consent of instructor; completion of Internal Medicine 430, Surgery 430. Four-week rotation designed as broad overview of PM&R practice for students interested in residency training in the specialty. Emphasis on evaluation and conservative treatment of spinal disorders, sports injuries, neuromuscular disease, neurological and non-operative orthopedic problems requiring rehabilitative management. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Spalding-Dias

**462. Rehabilitation Medicine Clinical Elective (5-18)**

Clinical activity—full time. Prerequisite: Internal Medicine 430, Surgery 430; completion of third year in Medical School. Emphasis on evaluation of patients with neurological or orthopaedic problems requiring rehabilitative techniques for their management. Introduction to management of such patients. Physical Medicine and Rehabilitation at off-campus facility must be approved by Chairperson. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**493. Applied Musculoskeletal Anatomy: Sports & Spine SSM (6)**

Lecture—5 hours; lecture/laboratory—10 hours; laboratory—16 hours; clinical activity—4 hours. Prerequisite: consent of instructor. Restricted to UC Davis School of Medicine students only. This four week module will review the anatomy and biomechanics of the musculoskeletal system as well as its associated pathology. The students will be instructed on appropriate musculoskeletal exam techniques and logical approach to the patient in the clinical setting. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Shin

**498. Advanced Group Study (1-5)**

Prerequisite: consent of instructor. Study and experience for medical students in any of a number of areas in physical medicine and rehabilitation. (H/P/F grading only.)

**499. Research for Medical Students (1-12)**

Prerequisite: consent of instructor. Research on any of a variety of topics in physical medicine and rehabilitation. (H/P/F grading only.)

**Psychiatry (PSY)****Lower Division****92. Willow Clinic (1-2)**

Clinical activity—2-6 hours; seminar—1-2 hours. Open to lower division undergraduate students. Student run clinic for undergraduate students interested in learning about and meeting the unique health care needs for the homeless population. May be repeated for credit. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.) Han, McCarron

**Upper Division****192. Willow Clinic (1-2)**

Clinical activity—2-6 hours; seminar—1-2 hours; lecture—1-2 hours. Prerequisite: consent of instructor; UC Davis enrollment; upper-division standing. Student run clinic for upper division students interested in learning about and meeting the unique health care needs for the homeless population. May be repeated for credit. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.) Han, McCarron

**198. Directed Group Study (1-5)**

Prerequisite: advanced standing and consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: advanced standing and consent of instructor. (P/NP grading only.)

**Graduate****298. Directed Group Study For Graduate Students (1-5)**

Prerequisite: graduate standing and consent of instructor.

**299. Special Study for Graduate Students (1-12)**

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

**Professional****403. Fundamentals of Clinical Psychiatry (3)**

Clinical activity—1 hour; lecture—3 hours. Prerequisite: approval of SOM Committee on Student Progress; Restricted to medical students only. Psychiatric interviewing, Mental Status Exam and diagnosis. Major child and adult disorders, including substance

abuse and dependence. Weekly student interviews of psychiatric patients in small group format. (P/F grading only.)—W. (W) Hah, Newman

**410. Klingenstein Summer Elective (2.5)**

Clinical activity—20 hours. Prerequisite: consent of instructor. During this “mini-clerkship,” fellows will attend clinics, in-patient settings, and clinicians’ offices. They will meet weekly to present cases and review current literature, and will complete a summary narrative at the end of their experience. (P/F grading only.)—S. (S.) Horst

**410L. Klingenstein Longitudinal Elective (2)**

Clinical activity—5 sessions; laboratory/discussion—10 sessions; discussion—2 sessions. Prerequisite: consent of instructor. Year-long mentoring program provides clinical exposure to child and adolescent psychiatry healthcare during a medical student’s pre-clinical years. (P/F grading only; deferred grading only, pending completion of sequence.)—W, S, Su. (W, S, Su.) Horst

**412. Psychiatry Grand Rounds (1)**

Lecture—1 hour. Prerequisite: medical students or staff or other qualified mental health professionals with consent of instructor. Weekly conference at UCDMC for presentation of selected clinical cases, presentation of lecture and research reports. (H/P/F grading only.)—W, S, Su. (W, S, Su.) Scher

**413. Outpatient Psychiatry Clerkship (6)**

Clinical activity—36 hours; conference—2 hours; lecture—2 hours. Prerequisite: course 430 and/or consent of coordinator. Experience in clinical management/treatment of adult outpatients with psychiatric and substance abuse disorders; crisis management/intervention; evaluation/development of diagnosis and treatment plan; emphasis on outpatient psychopharmacology/brief psychotherapy; observation of group therapy. Individual supervision by faculty/residents. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Ton

**414. Psychosomatic Medicine Clerkship (3-12)**

Clinical activity—32 hours; discussion—8 hours. Prerequisite: Psychiatry Clerkship or consent of instructor; medical students only. A large university hospital service in which the student functions as a member of the team in evaluation, management and psychiatric liaison with other medical specialties. Intensive supervision from senior staff and psychiatric residents. May be repeated two times for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Liu

**415. Telemedicine Clinical Elective (3-9)**

Clinical activity—20 hours. Prerequisite: MS 4 with consent of Instructor. Fourth-year medical student elective in Telemedicine focusing on psychiatric issues. Align with University, School and Center for Health and Technology mission of rural outreach and public health, particularly in primary care. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Hiltz, Tomy

**416. Child Psychiatry Clerkship (6)**

Clinical activity—36 hours; lecture/discussion—2 hours; conference—2 hours. Prerequisite: course 430 and/or consent of instructor. Didactic and clinical inpatient, outpatient, and consultation-liaison experiences with children, adolescents and families. Clinical observations, diagnostic assessment, and treatment will be undertaken with close supervision. Literature review and case conferences presented on a regular basis. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Ton

**417. Jail Psychiatric Clerkship (6)**

Clinical activity—28 hours; conference—8 hours; lecture—4 hours. Prerequisite: course 430 and/or consent of course coordinator. Students gain experience, under close faculty supervision, assessing acute and chronic mentally ill inmates in both inpatient and clinic settings. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Ton

**418. Off-Campus Clinical Experience**

(3-9)

Clinical activity—20-40 hours. Prerequisite: fourth-year medical students; consent of instructor. Clinical or research elective in off-campus medical school or mental approval of instructor and individual in charge of off-campus setting. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**420. Acting Internship in Psychiatry (62)**

Clinical activity—40 hours. Prerequisite: course 430 and/or consent of course coordinator. Acting intern position with close faculty supervision with emphasis on biological psychiatry, psychopharmacology and psychodynamic aspects appropriate to diagnostic and long-term patient management. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Liu

**421. Combined Medicine-Psychiatry Clerkship (3-6)**

Clinical activity—32 hours; discussion—8 hours. Prerequisite: Psychiatry Clerkship or consent of instructor; medical students only. Students will rotate through the county Primary Care Clinic under the supervision of dual-boarded Psychiatry and Internal Medicine/Family Practice Faculty to provide medical care of indigent and uninsured patients as well as primary care for psychiatry patients. May be repeated for credit two times. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Han, Scher

**422. Readings in Psychiatry (1-3)**

Readings/discussion—3-9 hours. Independent reading of a selected topic in psychiatry. Supervision and discussion with a psychiatry faculty member. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Scher

**423. Willow Clinic (3-12)**

Prerequisite: open to medical students in all four years of medical school. Student run clinic for medical students interested in learning about and meeting the unique health care needs for the homeless population. May be repeated for credit. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Han, McCarron

**424. Functional Genomics (2)**

Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing or consent of the instructor. The theory, methods and principles of functional neurogenomics with emphasis on the relationship to molecular mechanisms involved in development and disease of the nervous system. (H/P/F grading only.)—W. (W.) Choudary

**430. Psychiatry Clinical Clerkship (12)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress. Assigned to clinical settings, students build upon the skills gained in preclinical years; emphasis on diagnostic, therapeutic and interpersonal skills. Areas of focus include patient management, interviewing skills, mental status exam, differential diagnosis, basic psychopharmacology, crisis assessment, intervention and case referrals. (H/P/F grading only.)—F, W, S, Su. Cox

**430FA. SJVP Longitudinal Psychiatry Clerkship at UCSF Track 1 (4)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks at UCSF Fresno. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only; deferred grading only, pending completion of sequence.)—S. (S.) Ton

**430FB. SJVP Longitudinal Psychiatry Clerkship at UCSF Track 1 (4)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks at UCSF Fresno. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are

required. May be repeated for credit. (H/P/F grading only; deferred grading only, pending completion of sequence.)—Su. (Su.) Ton

#### **430FC. SJVP Longitudinal Psychiatry Clerkship at UCSF Track 1 (4)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks at UCSF Fresno. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only; deferred grading only, pending completion of sequence.)—F. (F.) Ton

#### **430FD. SJVP Longitudinal Psychiatry Clerkship at UCSF Track 2 (4)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks at UCSF Fresno. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only; deferred grading only, pending completion of sequence.)—F. (F.) Ton

#### **430FE. SJVP Longitudinal Psychiatry Clerkship at UCSF Track 2 (4)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks at UCSF Fresno. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only; deferred grading only, pending completion of sequence.)—W. (W.) Ton

#### **430FF. SJVP Longitudinal Psychiatry Clerkship at UCSF Track 2 (4)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; consent of instructor. Longitudinal Clerkship runs concurrently with Primary Care and Psychiatry for 24 weeks at UCSF Fresno. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only; deferred grading only, pending completion of sequence.)—S. (S.) Ton

#### **430TA. TeachMS Longitudinal Psychiatry Clerkship (A) (4)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Promotions; consent of instructor. Longitudinal Clerkship runs concurrently with Primary Care and Medicine for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only; deferred grading only, pending completion of sequence.)—F. (F.) Ton

#### **430TB. TeachMS Longitudinal Psychiatry Clerkship (B) (6)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Promotions; consent of instructor. Longitudinal Clerkship runs concurrently with Primary Care and Medicine for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. May be repeated for credit. (H/P/F grading only; deferred grading only, pending completion of sequence.)—W. (W.) Ton

#### **430TC. TeachMS Longitudinal Psychiatry Clerkship (C) (2)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Promotions; consent of instructor. Longitudinal Clerkship runs concurrently with Primary Care and Medicine for 24 weeks. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required.

May be repeated for credit. (H/P/F grading only; deferred grading only, pending completion of sequence.)—S. (S.) Ton

#### **439D. Directed Clinical Studies in Psychiatry (1-12)**

Clinical activity—40 hours. Prerequisite: consent of instructor. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **439R. Directed Studies in Psychiatry (1-12)**

Clinical activity—30 hours; independent study—10 hours. Prerequisite: consent of instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **480. Insights in Psychiatry (1-3)**

Clinical activity—3–9 hours. Prerequisite: first- or second-year medical student in good academic standing; consent of instructor. On individual basis, student provided with an opportunity for gaining insight into various clinical activities in the practice of psychiatry. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Cox

#### **488. Acting Internship in Inpatient Psychiatry, Away Rotation (6)**

Clinical activity—40 hours. Prerequisite: Psychiatry Clerkship and/or consent of course coordinator. Inpatient acting internship at approved non-UCDHS affiliated training program that provides experience and preparation for ambulatory medical care. Students perform as an intern, with a smaller number of patients, greater supervision, and responsibility for the ongoing care of assigned patients. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **489. Acting Internship in Ambulatory Psychiatry, Away Rotation (6)**

Clinical activity—40 hours. Prerequisite: Psychiatry Clerkship and/or consent of course coordinator. Outpatient acting internship at an approved non-UCDHS affiliated training program that provides experience and preparation for ambulatory medical care. Students perform as an intern, with smaller number of patients, greater supervision, and responsibility for the ongoing care of assigned patients. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **493. Culture, Medicine and Society (6)**

Seminar—12 hours; clinical activity—16 hours; independent study—8 hours; discussion—4 hours. Prerequisite: consent of instructor. Restricted to UC Davis School of Medicine students only. Students will learn about the epidemiological significance of health disparities and barriers to access to health care. Covers (1) Epidemiology/Health Disparities; (2) Society and Medicine; (3) Cinemedication; (4) Reflection/Integration. (H/P/F grading only.)—S. (S.)

#### **498. Directed Group Study (1-5)**

Prerequisite: consent of instructor. Approved for graduate degree credit. Medical students desiring to explore particular topics in depth. (H/P/F grading only for graduate or medical students.)

#### **499. Research (1-12)**

Prerequisite: consent of instructor. Approved for graduate degree credit. Individual research on selected topics or research projects. (H/P/F grading only for graduate or medical students.)

### **Public Health Sciences (SPH)**

#### **Lower Division**

#### **92. Internship in Community Health (1-12)**

Internship—3–36 hours. Prerequisite: lower division standing; consent of instructor. Students apply theory and concepts learned in the classroom through field work in a community health agency. (P/NP grading only.)

#### **Upper Division**

#### **101. Introduction to Public Health (3)**

Lecture—3 hours. Prerequisite: undergraduate standing. Provide basic concepts and controversies in public health, basic science of public health, social and behavioral factors in health and disease, environmental and occupational health issues, the relationship of public health to the medical care system and health care reform. GE credit: SciEng or SocSci | SE or SS. —W, S. (W, S.) McCurdy

#### **102. Introduction to Human Epidemiology (3)**

Lecture—1.5 hours; discussion—1.5 hours. Learn and understand the practice of epidemiology as it relates to human populations. The content is fundamental to the Public Health minor and a required core course. GE credit: SE. —S. (S.) Garcia

#### **104. Globalization and Health: Evidence and Policies (3)**

Lecture—3 hours. Provides an overview of the evidence on the multiple effects of globalization policies on health. GE credit: SS, WC. —W. (W.) De Vogli

#### **105. Health Disparities in the U.S. (2)**

Lecture—2 hours. Introduction to the principles and practice of health disparities research. GE credit: DD, SS. —W. (W.) Garcia

#### **132. Health Issues Confronting Asian Americans and Pacific Islanders (4)**

Lecture/discussion—4 hours. Health issues confronting Asian Americans and Pacific Islanders. (Same course as Asian American Studies 132.) GE credit: SocSci | SS. —W. (W.)

#### **160. General Health Education and Prevention (5)**

Lecture—4 hours; discussion—1 hour. Open to students in the internship program for the Health Education Program only; class size limited to 50 students. Topics include addiction, substance abuse/prevention, nutrition, stress management, physical fitness, body image, reproductive anatomy and physiology, contraceptive options, safer sex, sexual health, healthy relationships, and other general wellness/health promotion topics. Practice in peer counseling and outreach presentations. (P/NP grading only.)—Su. (Su.)

#### **161. Campus Alcohol/Drug Abuse Prevention Program Peer Educator Training (4)**

Lecture/discussion—3 hours; practice—1 hour. Prerequisite: course 160 (may be taken concurrently); consent of instructor. Preparation for internship in campus and community substance abuse prevention and educational intervention. Addiction and other physiological responses to alcohol and other drugs. Harm-reduction strategies for individuals and target populations. High risk behaviors. Practice in peer counseling skills and outreach presentations to small and large groups. (P/NP grading only.)—S. (S.)

#### **162. Health Advocates Peer Educator Training (4)**

Lecture/discussion—3 hours; practice—1 hour. Prerequisite: course 160 (may be taken concurrently); consent of instructor. Preparation for internship in campus and community health promotion and risk reduction. Nutrition, stress management, physical fitness, body image and disordered eating, skin cancer prevention, and other general wellness/health promotion topics. (P/NP grading only.)—S. (S.)

#### **175W. Health Policy and Health Politics (4)**

Seminar—3 hours; extensive writing or discussion—1 hour. Restricted to students attending UC Washington Center program. Following the model of a Congressional subcommittee, identification of four salient health policy issues for study, research, and development of model policies to address them. (Same Course as UC Davis Washington Center 175.) GE credit: SocSci, Wrt | ACGH, OL, SS, WE. —S. (S.) Wintemute

**190C. Research Conference in Community and International Health (1)**

Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference on research problems, progress, and techniques in Community and International Health. Critical discussion of recent journal articles. May be repeated for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

**192. Internship in Community Health Practice (1-12)**

Internship—3-36 hours. Prerequisite: upper division and graduate students; consent of instructor. The student, through fieldwork in a community health agency, learns to apply theory and concepts learned in the classroom. (P/NP grading only.)

**198. Study in Community and International Health (1-5)**

Prerequisite: undergraduate standing and consent of instructor. Study and experience for undergraduate students in any number of areas in community and international health. (P/NP grading only.)

**199. Research in Community and International Health (1-5)**

Prerequisite: undergraduate standing; consent of instructor. Student will work with faculty member in areas of research interest, including but not limited to injury control, international health, health policy, occupational and environmental health, health promotion and wellness, women's health, and health demographics. (P/NP grading only.)

**Graduate****201. Introduction to Public Health (3)**

Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: graduate standing or consent of instructor. Provides an overview of public health. Covers the history of public health in the U.S.; defines its major functions and constituencies; and, introduces fundamental principles of epidemiology, biostatistics, behavioral sciences, environmental health, infectious diseases, and reducing health disparities. May be repeated one time for credit.—Su. (Su.) Garcia

**203. Learning and Teaching in Public Health Contexts (2)**

Lecture/discussion—2 hours. Prerequisite: graduate standing or consent of instructor. Aimed at current and future public health professionals interested in learning more about the educational potential for interactions with community members and other health professionals—all stakeholders in improving the health of communities.—S. (S.) Cassady, Zieghahn

**204. Globalization and Health: Evidence and Policies (3)**

Lecture—3 hours. Open to graduate student standing. In-depth integration of advanced epidemiological concepts. Provides an overview of the evidence on the multiple effects of globalization policies on health.—F. (F.) De Vogli

**205. Health Disparities in the U.S. (2)**

Lecture—2 hours. Introduction to the principles and practice of health disparities research. GE credit: DD, SS.—W. (W.) Garcia

**207. Advanced Epidemiologic Methodology (4)**

Lecture/discussion—4 hours. Prerequisite: course 206. In-depth integration of advanced epidemiological concepts. Theory, methods, and applications for observational studies including random and systematic error, confounding, counterfactuals, causal inference, effect modification, internal and external validity, estimability, and interpretation of effect measures, and advanced study designs. (Same course as Epidemiology 206.)—S. (S.) Hertz-Pannier, Kass

**209. History of Epidemiology in Public Health (2)**

Lecture—0.5 hours; discussion—1.5 hours. Introduction to the history of epidemiology in solving major public health problems. Original historical articles will be read/discussed. Topics may include: infectious disease, accidents/adverse events, nutritional deficiencies, community vaccination trials, occupa-

tional exposures, cancer, birth defects, cardiovascular disease, and smoking. (Same course as Epidemiology 209.)—W. (W.) Hertz-Pannier

**210. Public Health Informatics (2)**

Lecture—2 hours; laboratory—2 hours. Restricted to upper division or graduate standing. Collection, verification, and utilization of data related to populations; infrastructure, functions, and tools used to generate public health knowledge supporting public health practices and policy development/dissemination. (S/U grading only.)—Su. (Su.) Hogarth

**211. Infectious Disease Epidemiology (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: introductory epidemiology course (e.g., Epidemiology 205). Infectious disease epidemiology and prevention, with emphasis on human and veterinary diseases of global health importance. Major global health epidemics and challenges of infectious diseases, by mode of transmission. (Same course as Epidemiology 231.)—W. (W.) DeRiemer

**212. Migration and Health (3)**

Lecture/discussion—3 hours. Prerequisite: graduate standing. Principles of migration and health. Topics will include demographics, public health invention programs, health care delivery, occupational health, and effects of international migration on the health in communities of origin, transit and destination. Guest presentations by outside experts. Offered in alternate years.—(S.) Schenker

**222. Social & Behavioral Aspects of Public Health (3)**

Lecture/discussion—3 hours. Prerequisite: consent of instructor required; graduate standing, Statistics 102 and 106. Theories and strategies of health behavior change at the individual, group, community, and environmental levels. Examples include: transtheoretical model, social networks, and social marketing. Theories are applied to solve common public health problems (cancer, obesity, smoking, and HIV/AIDS).—W. (W.) De Vogli

**223. Obesity Prevention in Community Settings (3)**

Lecture/discussion—3 hours. Prerequisite: consent of instructor. Look at causes of the obesity epidemic in the U.S.; identify and critically assess the research literature on various prevention strategies; understand, and apply evidence-based public health strategies to combat obesity; and translate the science to a general audience.—F. (F.) Cassady

**232. Health Communication (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Health communication theories and research traditions. Topics include consumer health information seeking; physician-patient interaction; information, social marketing, "edutainment," and media advocacy campaigns; social networks and coping; media influences on health; and new communication technologies in health promotion and healthcare delivery. (Same course as Communication 232.) Offered in alternate years.—(S.) Bell

**244. Introduction to Medical Statistics (4)**

Lecture/discussion—6 hours; laboratory/discussion—3 hours. Introduction to statistical methods and software in clinical, laboratory and population medicine. Graphical and tabular presentation of data, probability, binomial, Poisson, normal, t, F, and Chi-square distributions, elementary nonparametric methods, simple linear regression and correlation, life tables. Only one unit of credit for students who have completed Statistics 100 or Preventive Veterinary Medicine 402.—Su. (Su.) Yang

**245. Biostatistics for Biomedical Science (4)**

Lecture—4 hours. Prerequisite: Clinical Research 244 or course 244 or the equivalent; consent of instructor. Analysis of data and design of experiments for laboratory data. (Same course as Clinical Research 245.)—W. (W.) Kim

**246. Biostatistics for Clinical Research (4)**

Lecture—4 hours. Prerequisite: course 245 or Clinical Research 245. Emphasizes critical biostatistics for clinical research and targets biomedical audi-

ence. Students will develop understanding for basic planning and analysis of clinical studies and learn to develop collaborations with biostatisticians. (Same course as Clinical Research 246.) May be repeated for credit. Offered in alternate years.—W. Qi

**247. Statistical Analysis for Laboratory Data (4)**

Lecture—4 hours. Prerequisite: Clinical Research 245 or course 245. Statistical methods for experimental design and analysis of laboratory data including gene expression arrays, RNA-Seq, and mass spec. (Same course as Clinical Research 247.)—S. Rocke

**252. Social Epidemiology (2)**

Lecture/discussion—2 hours. Prerequisite: Epidemiology 205A; consent of instructor. Social determinants of health; psychosocial and physiological pathways; health and social inequality; gender and racial/ethnic disparities in health; social support, social cohesion and health; social gradient in behavioral risk factors; social ecological approaches to health intervention; interventions addressing social determinants. (Same Course as Epidemiology 252.)—S. (S.)

**255. Human Reproductive Epidemiology (3)**

Lecture—3 hours. Prerequisite: Preventative Veterinary Medicine 405, 406, Physics 220, Physiology 222 or equivalents or consent of instructor. Human reproductive effects and risk of reproductive disorders, examined from macro- and micro-environmental exposures in community and occupational settings, epidemiologic study designs and analyses. Offered in alternate years.—F. Hertz-Pannier

**262. Principles of Environmental Health Science (3)**

Lecture—3 hours. Prerequisite: consent of instructor required. Principles, approaches and issues related to environmental health. Recognizing, assessing, understanding and controlling the impact of people on their environment and the impact of the environment on the public.—F. (F.) Bennett

**264. Public Health Econometrics (2)**

Laboratory/discussion—3 hours. Prerequisite: consent of instructor. Principles of demand and supply; elasticity; benefits and costs; least squares regression; stepwise regression; economic and statistical significance; fixed and random effects; longitudinal data; non-linear relations; continuous and binary variables; instrumental variables; attrition bias; tobit regression; Two-part cost model. (S/U grading only.)—S. (S.) Leigh

**266. Applied Analytic Epidemiology (3)**

Lecture—2 hours; laboratory—2 hours. Prerequisite: Preventive Veterinary Medicine 404 or consent of instructor. Principles and applications in analysis of epidemiologic data. Methods of analyzing stratified and matched data, logistic regression for cohort and case-control studies, Poisson regression, survival-time methods. (Same course as Population Health and Reproduction 266.)—S. (S.) Kass, Kim

**273. Health Services Administration (3)**

Laboratory—3 hours. Prerequisite: consent of instructor. Limited enrollment. Structure and function of public and private medical care. Topics include categories and trends in national medical spending, predictors of patient use, causes of death, managed care, HMOs, Medicare, Medicaid, costs of technology, and medical care in other countries.—W. (W.) Leigh

**276. Critical Assessment in Health Policy and Economics (2)**

Lecture/discussion—2 hours. Course aims to develop critical reading skills of the health policy and health economics literature, mainly following the microeconomic paradigm and analytical techniques. Some basic concepts of micro economic theory will be explained in the class.—F. W. (F. W.) Yoo

**290. Topics in Public Health (1)**

Seminar. Prerequisite: consent of instructor. Open to students in Master of Public Health program, or permission of instructor. Seminar on key issues and current topics in public health. Course begins in August

**Fall 2011 and on Revised General Education (GE): AH=Arts and Humanities; SE=Science and Engineering; SS=Social Sciences;**

**ACGH=American Cultures; DD=Domestic Diversity; OL=Oral Skills; QL=Quantitative; SL=Scientific; VL=Visual; WC=World Cultures; WE=Writing Experience**

**Prefall 2011 General Education (GE): ArtHum=Arts and Humanities; SciEng=Science and Engineering; SocSci=Social Sciences; Div=Domestic Diversity; Wrt=Writing Experience**

**Quarter Offered: F=Fall, W=Winter, S=Spring, Su=Summer; 2017-2018 offering in parentheses**

SSII. Students must enroll in August, then Fall and Winter. The course is a series but grades and units are given at end of each quarter. May be repeated four times for credit. (S/U grading only.)—F, W, S, Su. (F, W, S, Su.) Kass, McCurdy

### **295. International Health (2)**

Lecture/discussion—2 hours. Prerequisite: graduate standing or consent of instructor. Forum for learning health issues and health care systems in other countries. Topics include health care for refugees, the impact of political strife on health, the health care professional in international settings. (S/U grading only.)—S. (S.) Koga

### **297. Public Health Practicum (1-16)**

Prerequisite: consent of instructor. Open to Master of Public Health students. Practical fieldwork experience in public health. Placement site will vary based on the interest and experience of each student. May be repeated four times for credit. (S/U grading only.)—F, W, S, Su. (F, W, S, Su.) McCurdy

### **298. Study in Community and International Health (1-5)**

Prerequisite: graduate student in good academic standing; consent of instructor. Study and experience for graduate students in any number of areas in community and international health. (S/U grading only.)—F, W, S, Su. (F, W, S, Su.)

### **299. Research in Community and International Health (1-12)**

Prerequisite: graduate standing; consent of instructor. Student will work with faculty member in areas of research interest, including but not limited to injury control, international health, health policy, occupational and environmental health, health promotion and wellness, women's health, and health demographics. (S/U grading only.)—F, W, S, Su. (F, W, S, Su.)

## **Professional**

### **402. Introductory Medical Spanish (2)**

Lecture—2 hours. Prerequisite: medical student or consent of instructor. The vocabulary needed to conduct a basic history and physical examination in Spanish. (H/P/F grading only.)—S. (S.)

### **461. Clerkship in Community Health Group Practice (3-9)**

Clinical activity—full time (2-6 weeks). Prerequisite: third- or fourth-year medical student. Overview of local community health in group practice situations. Students participate in treatment at several clinic sites in Yolo County. Topics include primary care, environmental health, maternal and child health, jail health, and preventive health care for the aged. (S/U grading only.)—F, W, S, Su. (F, W, S, Su.)

### **465. Community Health Preceptorship (3-18)**

Clinical activity—5-40 hours. Prerequisite: fourth-year medical student; consent of instructor. Participate at state or county health department or other public health organization in on-going investigations into current public health problems, e.g., birth defects, cancer control, diabetes, hypertension, injury control, infectious diseases, aging, Alzheimer's disease, and smoking and tobacco use control. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) McCurdy

### **466. Occupational and Environmental Medicine Elective (6-12)**

Clinical activity; laboratory. Prerequisite: fourth-year medical student in good academic standing; consent of instructor. Participate in activities of Occupational and Environmental Health Unit. Major activity is involvement in an epidemiologic research project of the University. Participate in Occupational and Environmental Medicine Clinic at UC Davis Medical Center and other sites, as arranged. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) McCurdy

### **470. Clinical Selective in Occupational and Environmental Medicine (3-6)**

Clinical activity—9-18 hours. Prerequisite: fourth-year medical student in good academic standing; consent of instructor. Outpatient clinical experience in Occupational and Environmental Medicine at

UCDMC and other sites, as arranged. Gain experience in evaluating occ/env medical conditions, use of medical literature resources, the worker's compensation system, and toxicological principles. Students may take up to four weeks for six units. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) McCurdy

### **480. Insights in Occupational and Environmental Medicine (1-3)**

Clinical activity—3-9 hours. Prerequisite: first- or second-year medical student in good academic standing; consent of instructor. Observe and participate in research and clinical activities in occupational and environmental medicine which include conferences, occupational and environmental medicine clinical activities and field visits. Develop and present small individual research projects. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.) McCurdy

### **495. International Health (2)**

Lecture/discussion—2 hours. Prerequisite: medical student in good academic standing; consent of instructor. Forum for learning health issues and health care systems in other countries. Topics include health care for refugees, the impact of political strife on health, the health care professional in international settings. (H/P/F grading only.)—S. (S.) Koga, Schenker

### **496. Current Issues in Public Health (1)**

Lecture/discussion—1 hour. Topical issues in public health. Speakers from the local public health community address issues such as disease control programs, access to care. May be repeated up to three times for credit. (P/F grading only.)—S. (S.) McCurdy

### **498. Study in Public Health Sciences (1-6)**

Prerequisite: medical student in good academic standing and consent of instructor. Study and experience for medical students in areas in community and international health. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

### **499. Research in Public Health Sciences (1-9)**

Prerequisite: medical students with consent of instructor. Work with faculty member in areas of research interest, including but not limited to public health, injury control, international health, health policy, occupational and environmental health, health promotion and wellness, women's health, and health demographics. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

## **Radiation Oncology (RON)**

### **Upper Division**

#### **199. Special Study for Advanced Undergraduates; Research in Radiation Biology (1-5)**

Prerequisite: undergraduate standing; consent of instructor. Radiation Oncology is a unique discipline combining elements of clinical practice linked to complex physics based dosimetry and treatment planning. Included within this clinical environment is a strong basis in biology that underpins the clinical effectiveness of radiation treatment. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.) Vaughan

### **Graduate**

#### **211. Introduction to Radiation Oncology Physics (3-6)**

Prerequisite: consent of instructor; restricted to physics and engineering graduate students and senior undergraduate physics majors. Class size limited to three students. Introduction to radiation oncology physics. Overview of treatment methodologies. Medical physics equipment. Treatment machine dosimetry, including calibration. Machine quality assurance. Patient dosimetry. Treatment planning. Simulation and treatment. Treatment quality assurance, including calculation checks and chart checks. Brachytherapy. (S/U grading only.)—F, W, S, Su. (F, W, S, Su.) Stern

### **299. Independent Study and Research (1-12)**

Laboratory—3-40 hours. Prerequisite: enrollment with a Graduate Group for Ph.D. candidacy and consent of Group Adviser and Sponsor. Research under supervision of Radiation Oncology faculty. Work must be appropriate to fulfill the requirements for the Ph.D. degree. (S/U grading only.)—F, W, S, Su. (F, W, S, Su.) Coleman, Li, Vaughan

## **Professional**

### **420. Radiobiology Lecture Course (1)**

Lecture—1 hour. Prerequisite: Biological Sciences 1A, Mathematics 12, Physics 1A. Radiobiology lectures are designed to engage the physician residents, physics residents and medical students in learning Radiobiology principles and concepts during the year the Radiation Physics course is taught. May be repeated two times for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Coleman, Li, Vaughan

### **463. Radiation Oncology Clerkship (3-9)**

Clinical activity—30 hours. Prerequisite: completion of Medical Sciences 430, 431; third-year clinical clerkship, consent of instructor required. Introduction to radiation oncology. Students will participate in workup and treatment planning for radiation oncology patients and will be introduced to the concepts involved in clinical radiation oncology, radiation biology, and radiation physics. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Fragoso

### **465. Externship in Radiation Oncology (3-16)**

Clinical activity—30 hours. Prerequisite: consent of instructor. Externship provides in-depth exposure to the field of Radiation Oncology for students who rotate through an affiliated institution. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Fragoso

### **499. Independent Study and Research in Therapeutic Radiology (1-12)**

Prerequisite: consent of instructor. Advanced-level research seminar in clinical and/or translational radiation oncology. Work with the course instructor to generate a testable hypothesis. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Coleman, Fragoso, Li, Mayadev, Monjazeb, Vaughan

## **Radiology—Diagnostic (RDI)**

### **Professional**

#### **413. Radiological Diagnosis II (Physics of Diagnostic Radiology) (5)**

Lecture—49 hours total; laboratory—6 hours total. Prerequisite: consent of instructor. Physics of diagnostic imaging; x-ray production and interaction; image formation; modulation transfer function; fluoroscopy; cine fluoroscopy; stereoscopy; xeroradiography; computerized and geometrical tomography; magnetic resonance and ultrasound. Principles of radiation protection in imaging will be covered. (H/P/F grading only.)—F. (F.) Seibert, Boone

### **414. Medical Radiation Biology (3)**

Lecture—27 hours total. Prerequisite: consent of instructor. Medical radiation biology; molecular cellular and organ system response to acute and chronic irradiation; radiation carcinogenesis and genetic effects; radiation risk assessment; diagnostic ultrasound and magnetic resonance imaging health effects. Medical/legal considerations of radiation exposure. Offered in alternate years. (H/P/F grading only.)—S. Bushberg

### **461. Advanced Clinical Clerkship in Diagnostic Radiology (3-6)**

Clinical activity—35 hours; conference—4 hours; discussion/laboratory—1 hour. Prerequisite: satisfactory completion of second year medical school curriculum and of third-year clerkships in Internal Medicine and General Surgery; consent of instructor. Restricted to eight students per rotation; open to visiting medical students from accredited programs. Work with clinical Radiologists in image interpretation fluoroscopy angiography image-guided intervention cardiac stress testing radionuclide therapy.

Daily conferences in Radiology Diagnosis and Therapy Health Physics Radiation Safety. Prepare two clinical cases for in-class presentation. Assigned readings. May be repeated for credit. (H/P/F grading only)—F, W, S, Su. (F, W, S, Su.) Bateni, Shakeri

#### **462. Diagnostic Imaging of Acquired and Congenital Heart Disease (2)**

Lecture/discussion—5 hours (for 3 weeks). Prerequisite: fourth-year medical student in good academic standing and course 461 (may be taken concurrently). Main emphasis on radiology of acquired and congenital heart disease, but also on magnetic resonance, nuclear medicine, and echocardiography of heart diseases. (H/P/F grading only.)—S. (S.)

#### **473. Advanced Clinical Clerkship in Neuroradiology (3-6)**

Clinical activity—35 hours; conference—4 hours; independent study—1 hour. Prerequisite: fourth-year medical student with interest in Diagnostic Radiology, Neuroradiology, Neurology, Neurosurgery, Psychiatry, Psychology, or related field; satisfactory completion of course 461, or the equivalent, is strongly encouraged. Restricted to one student per 2/4 week rotation. Work with Neuroradiologists in image interpretation of CT, MRI, and fluoroscopy. Opportunity to participate in assessment of Neurointerventional patients, and to observe Neurointerventional procedures. Daily conferences in Neuroimaging, General Radiology, Health Physics, and Radiology Safety. Assigned readings. Credit limited to 3 units for 2 weeks; 6 units for 4 weeks. May be repeated for credit. (H/P/F grading only)—F, W, S, Su. (F, W, S, Su.) Bobinski

#### **474. Advanced Clinical Clerkship in Pediatric Radiology (3-6)**

Clinical activity—30 hours; conference—5 hours; film viewing—3 hours; independent study—2 hours. Prerequisite: fourth-year medical students with interest in Radiology and/or Pediatrics; interested third-year medical students who have successfully completed Pediatrics clinical clerkships may enroll, given availability and consent of the instructor of record; prior completion of course 461, or the equivalent, encouraged. Restricted to two students per two-week or four-week rotation. Participation in the radiological care of Pediatric patients; evaluate the patient receiving the radiographic study, including pertinent historical/physical findings. Student expected to write up case files on interesting cases encountered during their rotation. Credit limited to 3 units for 2 weeks, or 6 units for 4 weeks. May be repeated for credit. (H/P/F grading only)—F, W, S, Su. (F, W, S, Su.) Gorges

#### **475. Advanced Clinical Clerkship in Musculoskeletal Radiology (MSK) (3-6)**

Clinical activity—35 hours; conference—4 hours; discussion/laboratory—1 hour. Prerequisite: fourth-year medical student with interest in Musculoskeletal Radiology, Orthopedic Surgery, Sports Medicine, PMNR, or related field; satisfactory completion of course 461, or the equivalent, is strongly encouraged. Restricted to one student per 2/4 week rotation. Work with Musculoskeletal Radiologists in interpretation of CT, MRI, radiography, and fluoroscopy. Opportunity to assess patients for, and to observe imageguided procedures. Daily conferences in Musculoskeletal Imaging, General Radiology, Health Physics, and Radiology Safety. Assigned readings. Credit limited to 3 units for 2 weeks, 6 units for 4 weeks. May be repeated for credit. (H/P/F grading only)—F, W, S, Su. (F, W, S, Su.) Bateni

#### **476. Advanced Clinical Clerkship Vascular/Interventional Radiology (IR) (3-6)**

Clinical activity—35 hours; conference—4 hours; discussion/laboratory—1 hour. Prerequisite: fourth-year medical student with interest in Diagnostic Radiology, Vascular/Interventional Radiology, Cardiovascular Imaging, Cardiology, Cardiovascular Surgery, Surgical Oncology, General Surgery, or related field; satisfactory completion of course 461, or the equivalent, is strongly encouraged. Restricted to one student per 2/4 week rotation. Medical student will work with Vascular/Interventional Radiolo-

gists in the evaluation of patients for interventional procedures. There will be opportunities to Daily conferences in Neuroimaging, General Radiology, Health Physics, and Radiology Safety. Assigned readings. Credit limited to 3 units for 2 weeks, 6 units for 4 weeks. May be repeated for credit. (H/P/F grading only)—F, W, S, Su. (F, W, S, Su.) Link

#### **477. Advanced Clinical Clerkship in Ultrasound Radiology (3-6)**

Clinical activity—30 hours; conference—5 hours; film viewing—3 hours. Prerequisite: fourth-year medical student with interest in Radiology, OB/GYN, or in other medical or surgical subspecialties employing ultrasound in their clinical practice; prior completion of course 461, or the equivalent, is encouraged. Restricted to two students per 2/4 week rotation. Participation as an active team member on a busy clinical ultrasound service. Credit limited to 3 units for 2 weeks, 6 units for 4 weeks. May be repeated for credit. (H/P/F grading only)—F, W, S, Su. (F, W, S, Su.) McGahan

#### **478. Advanced Clinical Clerkship Abdominal Imaging (3-6)**

Clinical activity—35 hours; conference—4 hours; discussion/laboratory—1 hour. Restricted to two students per 2/4 week rotation. Work with clinical Radiologists on abdominal and pelvic CT, MR, ultrasound, digital radiography, gastrointestinal and genitourinary procedures, image-guided intervention. Offered as a 2-week rotation for third-year medical students and a 2/4-week rotation for fourth-year medical students. Credit limited to 3 units for 2 weeks, 6 units for 4 weeks. May be repeated for credit. (H/P/F grading only)—F, W, S, Su. (F, W, S, Su.) Lamba

#### **479. Specialty Externship in Radiology (3-16)**

Clinical activity—25 hours; discussion—10 hours. Prerequisite: consent of instructor. Externship provides in-depth exposure to one of a variety of subspecialties in Radiology. May be repeated for credit. (H/P/F grading only)—F, W, S, Su. (F, W, S, Su.) Haggé

#### **498. Group Study in Diagnostic Radiology (1-12)**

Prerequisite: consent of instructor. (H/P/F grading only.)

#### **499. Independent Study and Research in Therapeutic Radiology (1-18)**

Prerequisite: consent of instructor. Advanced-level research seminar in clinical and/or translational radiation oncology. Work with the course instructor to generate a testable hypothesis. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Coleman, Fragoso, Li, Mayadev, Monjazeb, Vaughan

### **Radiology—Nuclear Medicine (RNU)**

#### **Upper Division**

##### **198. Directed Group Study (1-5)**

Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

##### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

#### **Graduate**

##### **299. Research: Special Study for Graduate Students (1-12)**

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

#### **Professional**

##### **401. Biomedical Radiochemistry (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: open to graduate and medical students; consent of instructor. Approved for graduate degree credit. Course is designed to combine basic nuclear physics, chemistry, and biology into a comprehensive and vigorous lecture-laboratory experience in bio-

medical nuclear chemistry. Subjects include choice and purification of appropriate gamma and beta radioisotopes, compounding biological pharmacodynamics and radioimmunoassay. (H/P/F grading only.)—S. (S.)

#### **411. Radiological Physics I (Physics of Nuclear Medicine) (5)**

Lecture—43 hours total; laboratory—12 hours total. Prerequisite: consent of instructor. Physics of diagnostic and therapeutic nuclear medicine, nuclear physics, radioactive decay; interaction of ionizing radiation; dosimeters; attenuation; internal and external dosimetry; health physics; radiation detection and imaging, scintillation cameras, computerized planar and tomographic imaging. Offered at UC Davis Medical Center. Offered in alternate years. (H/P/F grading only.)—(F.) Bushberg, Vera

#### **463. Clinical Clerkship in Nuclear Medicine (3-8)**

Clinical Activity—full time (2-6 weeks). Prerequisite: satisfactory completion of second-year medical school; Radiology—Diagnostic 461 recommended; consent of instructor. Limited enrollment. Clerkship correlates radioisotopic methods with clinical, pathophysiological, and other diagnostic aspects of the patient's care. Each patient reviewed with student by faculty member. Reading assignments, informal projects, and research techniques available. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Shelton

#### **498. Group Study in Nuclear Medicine (1-12)**

Prerequisite: consent of instructor. Approved for graduate degree credit. (H/P/F grading only for medical students.)

#### **499. Research in Nuclear Medicine (1-12)**

Prerequisite: consent of instructor. Approved for graduate degree credit. (H/P/F grading only for medical students.)

### **Surgery (SUR)**

#### **Lower Division**

##### **99. Cardiovascular Tissue Engineering Research (1-5)**

Laboratory—3-15 hours. Multidisciplinary research in cardiovascular tissue engineering and regeneration for acquired and congenital cardiovascular disease. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.) Si

#### **Upper Division**

##### **192. Internship in General Surgery (1-12)**

Internship—3-36 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in general surgery and related fields. (P/NP grading only.)

##### **199. Special Study in General Surgery for Advanced Undergraduates (1-5)**

Prerequisite: advanced undergraduate student with consent of instructor. (P/NP grading only.)

#### **Graduate**

##### **299. Research (1-12)**

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

#### **Professional**

##### **430. Surgery Clerkship (12)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress. Eight week general surgery clerkship includes GI, Burn, Oncology, Plastics, Vascular Cardiothoracic, consult, transplant and trauma. Clerkship assignments are at UCDMC. Daily core material presentations and reading assignments. Student involvement includes work-up and care of surgical patients. (H/P/F grading only.)—F, W, S, Su. Wisner

##### **430F. SJVP Surgery Clerkship at UCSF (12)**

Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress. Eight-week general surgery clerkship includes GI, Burn, Oncology, Plastics, Vascular Cardiotho-

racic, consult, transplant and trauma. Clerkship assignments are at UCSF Fresno. Daily core material presentations and reading assignments. Student involvement includes work-up and care of surgical patients. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Wisner

#### **439D. Directed Clinical Studies in Surgery (1-12)**

Clinical activity—40 hours. Prerequisite: partial completion of a Clinical Rotation; consent of instructor. Individual directed studies in extended preparation for modified curriculum or to complete a clinical rotation following a leave of absence. May be repeated for credit. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **439R. Directed Studies in Surgery (1-12)**

Clinical activity—30 hours; independent study—10 hours. Prerequisite: consent of instructor. Individual directed studies in extended preparation for remediation of all or part of clinical rotation. Clinical studies to accommodate and satisfy remedial work as directed by the Committee on Student Progress and approved by the course IOR. May be repeated for credit. (P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **450. Surgical Skills Boot Camp (3-6)**

Workshop—10 hours; independent study—30 hours. Prerequisite: consent of instructor. Goal of the surgical skills boot camp didactic is to enable students to demonstrate competence in basic surgical skills and theory, using analytical thinking and hands-on simulation. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Pierce

#### **461. Surgery Burn Unit Clerkship (6 or 9)**

Clinical activity. Prerequisite: fourth-year medical student or third-year medical student with completion of course 430; consent of instructor. Externship in the eight-bed Burn Unit, and the 80 bed Shriners Hospital for Children. Principles of critical care, fluid and electrolyte resuscitation and management of surgical wounds in both adults and children. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Greenhalgh

#### **462. Surgery Trauma Service Clerkship (6 or 9)**

Clinical activity. Prerequisite: fourth-year medical student, or third-year medical student with completion of course 430; consent of instructor. Student works as an extern on one of the two general surgery Trauma teams, participating in resuscitation and management of critically injured patients. Team hours consist of 24 hours on, and 24 hours off. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Phan, Salcedo

#### **463. Surgery Intensive Care Unit (6 or 9)**

Clinical activity. Prerequisite: fourth-year medical student, or third-year medical student with completion of course 430; consent of instructor. Student participates in direct supervision of critically ill surgical patients in a twelve-bed surgery ICU. Each student is closely supervised. Provides in-depth experience with management of critically ill patients. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Coccoanour

#### **466. Clinical Plastic Surgery Elective (3-9)**

Clinical activity—50 hours. Prerequisite: third- or fourth-year medical students; Surgery 430; consent of instructor. Total involvement in patient care involving surgical preparation, treatment, operative care, and follow-up. Developing and understanding reconstruction and aesthetic plastic surgery. Microvascular surgery included. Student rotation. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **467. Surgical Oncology (3-9)**

Clinical activity. Prerequisite: fourth-year medical student, or third-year medical student with completion of course 430; consent of instructor. Students actively participate in management of patients requiring surgery for cancer, endocrine disease and selected general surgical problems. Cases include malignant melanoma, sarcomas, gastrointestinal

cancer, head and neck pathology, and metastatic malignancies. Attending rounds daily. Four teaching conferences weekly. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Bold

#### **468. Cardiothoracic Surgery Clerkship (6-9)**

Clinical activity. Prerequisite: fourth-year medical student, or third-year medical student with completion of course 430; consent of instructor. Student works as an extern on the Cardiothoracic Surgical Service, participating in perioperative management and operations on the heart, lungs, mediastinum, and other thoracic structures. Regularly scheduled teaching conferences are conducted. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Young

#### **471. Gastrointestinal Surgery (3-9)**

Clinical activity. Prerequisite: fourth-year medical student or third-year medical student with completion of course 430, Internal Medicine 430 and Pediatrics 430; consent of instructor. Student participates on the GI Surgery Service, working under the immediate supervision of the faculty and surgical housestaff, involving the full spectrum of gastrointestinal diseases performed by the medical student. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Ho

#### **472. Vascular Surgery (3-9)**

Clinical activity—full time. Prerequisite: fourth-year medical student or third-year medical student with completion of course 430, Internal Medicine 430 and Pediatrics 430; consent of instructor. Student participates on the vascular surgery service and in the management and operations of arterial and venous system, exclusive of diseases that require cardiopulmonary bypass for treatment. Includes patient care responsibilities with appropriate supervision. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Dawson, Humphries

#### **475. Pediatric Surgery (6-9)**

Clinical activity. Prerequisite: fourth-year medical student or third-year medical student with completion of course 430; consent of instructor. Care of patients with neonatal congenital surgical problems. Fluid and electrolyte management in infants. General experience with acquired surgical diseases in children. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Marr

#### **476. Surgical Consult Service (6-9)**

Clinical activity. Prerequisite: fourth-year medical student or third-year medical student with completion of course 430; consent of instructor. Students function as acting interns working in parallel with the interns on the service. They consult on all non-trauma patients in the emergency room and on the wards and also participate in the operating room. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Wisner

#### **477. Clinically Oriented Anatomy (3)**

Clinical activity—40 hours. Prerequisite: completion of three years of medical school. Restricted to fourth-year medical student only. Anatomy of selected regions of the body using cadaver dissection, projections and interactive CD-ROMs. Anatomical relationships relevant to common surgical procedures. Surgical and interventional radiology procedures. (H/P/F grading only.)—W. (W.) Khatri

#### **478. Surgical Preceptorship: Off Campus (3-18)**

Clinical activity—60 hours. Prerequisite: fourth-year medical student; consent of instructor. Student participates in the preoperative, operative and postoperative care of surgical patients under the supervision of attending staff. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Holcroft

#### **480. Insights in Surgery (1-3)**

Clinical activity—3-9 hours. Prerequisite: medical student in good academic standing and consent of instructor. Individualized activities, including ward rounds, subspecialty clinics and conferences, grand rounds, and observation of a variety of surgical procedures. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **481. Interactive Clinical Case Presentation (ICCP) (3)**

Clinical activity—1 hour. Prerequisite: fourth-year medical students; however, course is open for third and fourth year student observers. Course taught as one session (4 hours) per month for three quarters (July to March); students who enroll can earn up to three credits and the minimum requirements will be to attend at least six sessions; students can do all nine sessions and work toward an honor; for the written part students will have to pick two of the nine case presentations and write a detailed paper with a literature review on "The Current management" of that disease; this can in fact be a manuscript submitted for publication with a faculty member as an adviser; maximum of 10-15 students in good standing. Case presentation of common clinical scenarios (i.e. chest pain/MI; fever/pneumonia; abdominal pain/cholecystitis etc.) from various disciplines held in an auditorium with real patients exposure. Interactive session to review history, physical findings and case management. Students will be asked to perform H&P. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Khatri

#### **493. Clinically-Oriented Anatomy Special Study Module (6)**

Lecture—5 hours; lecture/laboratory—10 hours; laboratory—16 hours; clinical activity—4 hours. Prerequisite: consent of instructor. Restricted to School of Medicine students only. Reviews aspects of the anatomy of the head and neck, thoracic cavity, abdomen, pelvis, extremities, vascular system, peripheral nervous system and central nervous system. Focus on the understanding of anatomy related to common surgical procedures. (Cell Biology and Human Anatomy 493.) (H/P/F grading only.)—S. (S.) Blankenship, Khatri

#### **493B. Critically Ill Surgical Patients SSM (6)**

Lecture—5 hours; lecture/laboratory—10 hours; laboratory—16 hours; clinical activity—4 hours. Prerequisite: consent of instructor. Restricted to UC Davis School of Medicine students only. Special Study Module, a four week course on the topic: Application of Basic Cardiopulmonary Physiology to Problems Encountered in Critically Ill Surgical Patients. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Holcroft

#### **493C. Physiological Principles in SICU SSM (6)**

Lecture—5 hours; lecture/laboratory—10 hours; laboratory—16 hours; clinical activity—4 hours. Prerequisite: consent of instructor. Restricted to UC Davis School of Medicine students only. Special Studies Module, A four week course on the topic: Care of the Critically Ill Surgical Patient: Use of Physiological Principles to Guide Treatment of Patients with Common Surgical Problems. (Same course as Human Physiology 493C.) (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Cala, Holcroft

#### **493D. Interdisciplinary Study of Gastrointestinal Cancer (6)**

Lecture—5 hours; clinical activity—12 hours; laboratory—3 hours; discussion/laboratory—20 hours. Prerequisite: consent of instructor. In-depth study of gastrointestinal, hepatic and pancreatic cancer. Emphasis on an integration of basic science and clinical medicine. Participating departments include pathology, surgical oncology, medical oncology, gastroenterology, radiology and radiotherapy. (Same course as Pathology 493.) (H/P/F grading only.)—F, S. (F, S.) Khatri, Olson, Ruebner

#### **494H. Fourth-Year Surgical Honors Program (18)**

Prerequisite: completion of third year of medical school with superior performance on course 430; consent of instructor. To provide intensive and comprehensive training in surgery to students interested in a postgraduate surgical career, that would enable them to succeed during the internship and residency training. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Holcroft

**495. Intense Introduction to Cardiac Surgery (3)**

Clinical activity—16 hours; lecture/discussion—4 hours. Prerequisite: consent of instructor. Restricted to Medical student between first and second year. Close contact with vascular surgeon for two-week period. Includes Sunday mornings. 100% mandatory attendance. Physiology of going on and off cardiopulmonary bypass. Atherosclerotic cardiovascular disease, structural and valvular heart disease and electrical and rhythmic heart disease. May be repeated one time for credit. (P/F grading only.)—Su. (Su.) Jan

**498. Group Study (1-5)**

Prerequisite: medical student; consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**499. Laboratory Research (1-12)**

Laboratory—3-36 hours. Prerequisite: completion of second year of medical school; consent of instructor. Laboratory research on surgically related problems. Participation in projects to include the following: burn, nutrition, oncology, transplant and others. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**Surgery—Plastic Surgery (PSU)****Professional****460. Clinical Plastic Surgery Elective (1-18)**

Clinical activity—full time (approximately 40 hours per week). Prerequisite: third- or fourth-year medical students; Surgery 430; consent of instructor. Total involvement in patient care involving surgical preparation, treatment, operative care, and follow-up. Developing and understanding reconstruction and aesthetic plastic surgery. Microvascular surgery included. Student rotation. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Wong

**Urology (URO)****Upper Division****199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Professional****400. Office Urology (1)**

Clinical activity—4 hours in afternoons (6 weeks). Prerequisite: fourth-year medical students with consent of instructor. Introduction to ambulatory care of urologic patients including basic therapeutic and diagnostic procedures from case material referred to private clinic. Management of urinary tract infection will be emphasized. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.)

**460. Urology Clinical Clerkship (5-18)**

Clinical activity—full time. Prerequisite: second-year medical student; physical diagnosis or the equivalent; consent of instructor. Limited enrollment. Clinical experience in diagnosis and treatment of urologic disease. Student will work closely with house staff, participate in conferences and surgery, and perform initial patient evaluation on new patients. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Low

**461. Externship in Urology (3-18)**

Clinical activity—60 hours. Prerequisite: fourth-year medical student; consent of instructor. Under supervision, student acting as intern will assume full inpatient responsibility including admission history, physical examination, management of hospitalization, and participate in surgical procedures, outpatient clinic and learning diagnostic and therapeutic procedures. May be repeated for credit. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Low

**499. Research in Urology (1-12)**

Research—3-36 hours. Prerequisite: medical or veterinary medical students with consent of instructor. Research in oncology, male infertility, urodynamics, neurogenic bladder. Unique opportunity to apply

recent technologies (nuclear medicine resonance, flow cytometry, recombinant DNA) in investigation, diagnosis and treatment of GU cancer, infectious disease, male infertility and development of genitourinary bioprosthetics. (H/P/F grading only.)—F, W, S, Su. (F, W, S, Su.) Ghosh, Kurzrock

## Medicine and Epidemiology

See **Medicine and Epidemiology (VME), on page 582.**

## Medieval and Early Modern Studies

(College of Letters and Science)

Claire Waters, Ph.D. (English), Program Director

**Program Office.** 176 Voorhies Hall  
530-752-2257; <http://mems.ucdavis.edu>

**Committee in Charge**

Carlson Arnett, Ph.D. (*German/Russian*)

Catherin Chin, Ph.D. (*Religious Studies*)

Sally McKee, Ph.D. (*History*)

Matthew Vernon, Ph.D. (*English*)

Heghnar Watenpaugh, Ph.D. (*Art History*)

**The Major Program**

The major in Medieval and Early Modern Studies examines the intellectual, political, and cultural forces that shaped modern European civilization during the period from the end of Ancient Rome (fifth century) to the beginning of the Enlightenment (mid-eighteenth century). An interdisciplinary and interdepartmental program, the major includes studies in history, art history, philosophy, literature, drama, music, national languages, religion, rhetoric, and political theory.

**The Program.** The major requires interdisciplinary work, while allowing the student to focus on the early Middle Ages, the High Middle Ages, the Renaissance, or the Baroque. The series of medieval and early modern courses in the program provides the foundation for the major and prepares students for advanced work within the individual disciplines. On the upper-division level, students may choose course work in specific areas of History, Comparative Literature, English, French, German, Italian, Spanish, and Latin, philosophy and religion, arts and language, and political thought. In addition, each student may elect to complete a senior thesis on a selected aspect of medieval and/or early modern culture.

**Career Alternatives.** The major in Medieval and Early Modern Studies is a liberal arts degree providing excellent preparation for the rigors of professional schools as well as careers in law, museology, journalism, and teaching.

**Medieval and Early Modern Studies****A.B. Major Requirements:**

UNITS

**Preparatory Subject Matter.....22**

Medieval Studies 20A, 20B.....10

Three additional courses chosen from: Art History 1B, 1C, 1E; Comparative Literature 2, 10A, 10B, 10C, 10D, 10E; English 10A; German 48; History 4A, 4B; Humanities 1\*, 9; Philosophy 21, 22.....12

Language proficiency is a desideratum. Courses in Latin and other European languages are strongly recommended, particularly for students planning to pursue graduate studies in the medieval or early modern field.

**Depth Subject Matter.....44**

In consultation with the undergraduate adviser, students select a total of eleven courses from the following disciplines with at least three courses each from the medieval and early modern periods:

Art History 155, 156, 178A, 178B, 178C, 179B, 190B, 190C

Classics 110

Comparative Literature 139, 164A, 164B, 164C, 166A, 180\*

English 111, 113A, 113B, 115, 117, 122, 150A, 153\*, 165\*, 185A\*, 188\*, 189\*

French 115, 116, 117A, 118B, 141\*

German 101A, 112\*, 120, 121, 122, 124\*, 131, 134\*, 160

History 102B, 102D, 121A, 121B, 121C, 122, 125, 130A, 130B, 131A, 131B, 131C, 132, 135A, 136, 139A, 144A, 148A, 151A, 151B, 190B, 190C

Italian 105, 112, 113, 114, 115A, 115B, 115C, 115D, 118, 139B, 140, 141

Latin 100, 101, 102, 103, 104, 105, 106, 108, 109, 110, 112, 114, 115, 116, 118, 119, 120, 121, 125, 130

Medieval Studies 130A, 130B, 131, 189, 190

Music 121\*, 124A, 124B

Philosophy 105, 145, 168, 170, 172

Political Science 115, 116, 118A

Religious Studies 102, 115, 130\*

Spanish 130, 133N, 134A, 134B, 142\*

**Total Units for the Major .....66**

\* Prior approval by Undergraduate Adviser necessary.

**Major Adviser.** See Program office.

**Minor Program Requirements:**

UNITS

**Medieval and Early Modern Studies .....24**

The minor in Medieval and Early Modern Studies is a coherent program of interdisciplinary study. Medieval Studies units may be taken in one or more of the traditional fields of concentration, including art, history, literature, music, national languages, philosophy, political theory, and religious studies. Courses must be upper-division with at least two courses each from the medieval and early modern periods. Students may also select a minor with a thematic emphasis.

Although there is no foreign language requirement for the minor, knowledge of Latin or a modern European language is recommended.

The minor must be designed in consultation with the Undergraduate Adviser.

**Minor Adviser.** See Program office.

**Courses in Medieval Studies (MST)****Lower Division****20A. Early Medieval Culture (5)**

Lecture—3 hours; discussion—1 hour; extensive writing. Readings (in translation) in medieval culture, such as Codes of Justinian, Confessions of Saint Augustine, Beowulf, the Nibelungenlied, The Song of Roland, the Summa Theologica of Thomas Aquinas, the Chronicles of Froissart, Chaucer's Canterbury Tales, and Dante's Divine Comedy. GE credit: ArtHum, Wrt | AH, WC, WE.—F. (F.)

**20B. The Culture of the High Middle Ages (5)**

Lecture—3 hours; discussion—1 hour; extensive writing. Great transformations that created the modern world: Constitutional Government, the Hundred Years War, the Black Death, and the Peasants Revolts, the Renaissance, Reformation and Counter-Reformation, and the Baroque. GE credit: ArtHum, Wrt | AH, WC, WE.—W. (W.)

**98. Directed Group Study (1-5)**

(P/NP grading only.)

**99. Special Study for Undergraduates (1-5)**

(P/NP grading only.)

## Upper Division

### 130A. Special Themes in Medieval Cultures (4)

Lecture—3 hours; discussion—1 hour. Each offering concentrates on an interdisciplinary aspect of medieval culture in the Middle East and Europe: the idea of the hero, mysticism, urban development. Extensive readings focused on medieval source material. May be repeated for credit. GE credit: ArtHum, Wrt|AH, WC, WE.

### 130B. Special Themes in Renaissance Culture (4)

Lecture—3 hours; discussion—1 hour. Each theme illuminates an interdisciplinary aspect of Renaissance culture in the eastern and western hemispheres: exploration, medical pathology, daily life, baroque culture. Immersion in source material from 1500-1650. May be repeated for credit. GE credit: ArtHum, Wrt|AH, WC, WE.

### 131. Cross-Cultural Relations in the Medieval and/or Early Modern World (4)

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 20A or 20B or consent of instructor. Medieval and/or Renaissance aspects of cross culturalism. Relations between Christians, Jews, and Muslims: Europeans, Africans, and Asians; Old World and New World. Offered irregularly. GE credit: WC, WE.

### 189. Seminar in Medieval and Early Modern Culture (4)

Seminar—3 hours; term paper. Prerequisite: course 20A or 20B or consent of instructor. Focus on a particular problem or issue in the Medieval or Early Modern periods. Seminar topics might include (but not limited to) monasticism, origins of the university, chivalry, exploration, the role of women in the Medieval and Early Modern world. Offered in alternate years. GE credit: WE.

### 190. Senior Thesis (4)

Seminar—4 hours. Prerequisite: senior standing and major in Medieval Studies. Preparation of a research paper dealing with a selected aspect of medieval culture, under supervision of three members of the Committee in Charge.—F, W, S. (F, W, S.)

### 197T. Tutoring in Medieval Studies (1-4)

Seminar—2 hours. Prerequisite: courses 20A and 20B; upper division standing; consent of instructor and chairperson of curriculum committee. Tutoring in Medieval Studies 20A and 20B, including leadership in small discussion groups affiliated with the course. May be repeated for credit for a total of 6 units. (P/NP grading only.)

### 198. Directed Group Study (1-5)

(P/NP grading only.)

### 199. Special Study for Advanced Undergraduates (1-5)

(P/NP grading only.)

## Meteorology

See **Atmospheric Science**, on page 184.

## Mexican-American (Chicano) Studies

See **Chicana/Chicano Studies**, on page 203.

## Microbiology

See **Microbiology and Molecular Genetics**, on page 455; **Medical Microbiology (MMI)**, on page 442;

**Microbiology (A Graduate Group), on page 458; and Pathology, Microbiology, and Immunology (PMI), on page 582.**

## Microbiology and Molecular Genetics

### Formerly Microbiology

(College of Biological Sciences)

Wolf-Dietrich Heyer, Ph.D., Chairperson of the Department

**Department Office.** 357 Briggs Hall  
530-752-2626; <http://microbiology.ucdavis.edu>

### Faculty

#### Primary Department Members

Jacqueline Barlow, Ph.D., Assistant Professor  
Sean Collins, Ph.D., Assistant Professor  
Scott C. Dawson, Ph.D., Associate Professor  
Wolf-Dietrich Heyer, Ph.D., Professor  
Neil Hunter, Ph.D., Professor  
Michele M. Igo, Ph.D., Professor  
Stephen C. Kowalczykowski, Ph.D., Distinguished Professor

Su-Ju Lin, Ph.D., Professor

Miriam Martin, Ph.D., Lecturer

John C. Meeks, Ph.D., Research Professor

Douglas C. Nelson, Ph.D., Research Professor

Rebecca Parales, Ph.D., Professor

Martin L. Privalsky, Ph.D., Distinguished Professor

Katherine Ralston, Ph.D., Assistant Professor

John R. Roth, Ph.D., Distinguished Professor

Michael A. Savageau, Ph.D., Distinguished Professor

Kazuhiro Shiozaki, Ph.D., Visiting Professor

Mitchell H. Singer, Ph.D., Professor

Valley J. Stewart, Ph.D., Professor

Lifeng Xu, Ph.D., Assistant Professor

#### Secondary Department Members

Sean Burgess, Ph.D., Professor

Jodi Nunnari, Ph.D., Professor

Ted Powers, Ph.D., Professor

### Emeriti Faculty

Stanley W. Aritz, Ph.D., Professor Emeritus

Paul Baumann, Ph.D., Professor Emeritus

John L. Ingraham, Ph.D., Professor Emeritus

JaRue S. Manning, Ph.D., Professor Emeritus

David Pratt, Ph.D., Professor Emeritus

Chester W. Price, Ph.D., Professor Emeritus

Merna R. Villarejo, Ph.D., Professor Emerita

Mark L. Wheelis, Ph.D., Senior Lecturer Emeritus

### Affiliated Faculty

Eric D. Mann, Ph.D., Lecturer

### The Major Program

Microbiology is the branch of biology that deals with bacteria, yeasts and other fungi, algae, protozoa, and viruses. These microorganisms are ubiquitous in nature and play a crucial role in areas such as agriculture, biotechnology, ecology, medicine, and veterinary science. The field of microbiology contributes to areas of fundamental inquiry such as biochemistry, cell biology, evolution, genetics, molecular biology, pathogenesis, and physiology. The ease and power of simultaneous genetic and biochemical analysis of microbes led to the emergence of the new disciplines of molecular biology and molecular genetics, and spawned the new industry of biotechnology.

**The Program.** The Microbiology Undergraduate Program offers Bachelor of Science and Bachelor of Arts degrees in the College of Biological Sciences. Both degrees are designed to provide students with quantitative skills and knowledge across the breadth of Biological Sciences, while maintaining a focus on the biology of microorganisms. The B.S. degree offers more training in mathematics, biochemistry

and laboratory methodology; the A.B. degree incorporates more exposure to the liberal arts. The choice of a major program and its suitability for particular career options should be discussed with a major adviser.

**Career Alternatives.** A bachelor's degree in microbiology serves as the foundation for advanced study in microbiology, entry into the professional schools of all health sciences, or immediate employment in biotechnology, health care and food science industries.

### A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b> .....	<b>45-57</b>
Biological Sciences 2A-2B-2C.....	15
Chemistry 2A-2B.....	10
Chemistry 8A-8B or 118A-118B-118C .....	6-12
Mathematics 17A-17B or 21A-21B .....	8
Physics 1A-1B or 7A-7B-7C .....	6-12

### Depth Subject Matter..... 36

Biological Sciences 101, 105 (or 102+103).....	7-10
Microbiology 102, 104L, 105, 105L, 111 .....	15
Select at least one course from each of the areas of study below.	

#### Areas of Study:

1. Microbial Genetics: Microbiology 115, 150, 170 .....
2. Virology or Immunology: Microbiology 162; Medical Microbiology and Immunology 188; Pathology, Microbiology, and Immunology 126, 128 .....

Additional course work, chosen from the list below, to achieve a total of 36 or more units. Upper division Microbiology courses not used in satisfaction of any other requirement; or Biological Sciences 104, 181, 183; Food Science and Technology 104; Molecular and Cellular Biology 121, 182; Plant Pathology 130; Soil Science 111; or upper division courses in related fields, relevant to the student's interest and chosen in consultation with the adviser. No more than three units of variable-unit courses (numbered 192, 198 or 199) may be used for credit in this category. Note: Although a course might be listed in more than one category, that course may satisfy only one requirement in the entire major.

### Total Units for the Major..... 81-93

### B.S. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b> .....	<b>57-67</b>
Biological Sciences 2A-2B-2C.....	15
Chemistry 2A-2B-2C.....	15
Chemistry 8A-8B or 118A-118B-118C .....	6-12
Mathematics 17A-17B-17C or 21A-21B (21C recommended).....	8-12
Physics 7A-7B-7C .....	12
Microbiology 91 or 191 .....	1

### Depth Subject Matter..... 45

Biological Sciences 101, 105 (or 102+103), 104 .....	10-13
Statistics 100 or 102 .....	4
Microbiology 102, 104L, 105, 105L, 111 .....	15
Select at least one course from each of the areas of study below.	

**Areas of Study:**

1. Microbial Genetics: Microbiology 115, 150, 170 ..... 3
  2. Virology: Microbiology 162; Pathology, Microbiology, and Immunology 128 ..... 3-4
  3. Immunology: Medical Microbiology and Immunology 188; Pathology, Microbiology, and Immunology 126 ... 3
- Additional course work, chosen from the list below, to achieve a total of 45 or more units. Upper division Microbiology courses not used in satisfaction of any other requirement; or Biological Sciences, 181, 183; Food Science and Technology 104; Molecular and Cellular Biology 121, 182; Plant Pathology 130; Soil Science 111; or upper division courses in related fields, relevant to the student's interest and chosen in consultation with the adviser. No more than three units of variable-unit courses (numbered 192, 198, or 199) may be used for credit in this category.

Note: Although a course might be listed in more than one category, that course may satisfy only one requirement in the entire major.

**Total Units for the Major ..... 102-112**

**Master Adviser.** Su-Ju Lin, Ph.D.

**Advising.** Biology Academic Success Center (BASC); 1023 Sciences Laboratory Building; 530-752-0410; <http://basc.ucdavis.edu/>.

**Honors and Honors Program.** Su-Ju Lin, Ph.D.

**Teaching Credential Subject Representative.** Su-Ju Lin, Ph.D.; see the Teaching Credential/M.A. Program on page 124.

**Graduate Study.** The Graduate Group in Microbiology offers programs of study and research leading to the M.S. and Ph.D. degrees.

Strong preference is given to doctoral applicants. The group offers study in general microbiology, microbial physiology, microbial genetics, molecular mechanisms of microbial regulation, molecular mechanisms of microbial pathogenesis, immunology, virology, and recombinant DNA technology. For information on the graduate study and undergraduate preparation for the program contact a graduate adviser or the Chairperson of the Group.

**Related Courses.** The offerings of the Department of Microbiology and Molecular Genetics are augmented by courses in Food Science and Technology; Medical Microbiology; Molecular and Cellular Biology; Pathology, Microbiology, and Immunology; Plant Pathology; and Soil Science.

Faculty of the Department of Microbiology and Molecular Genetics also teach or participate in the following courses: Biological Sciences 2A, 101 104 and 181.

**Courses in Microbiology (MIC)****Lower Division****10. Natural History of Infectious Diseases (3)**

Lecture—3 hours. Topics in the natural history of infectious diseases principally affecting humans. Introduction to infectious microbial agents, ecology, epidemiology, and induction of disease. Focus on diseases of a contemporary nature. Not open for credit to students who have completed course 101, course 102, or course 104. GE credit: SciEng | SE. —F. (F.)

**91. Introduction to Research (1)**

Seminar—1 hour. Prerequisite: Biological Sciences 2A or equivalent. Restricted to lower division standing. Discussion of faculty research focusing on the biochemistry, genetics, and cell biology of microorganisms, along with ways undergraduates can participate in research projects of faculty members. May be repeated three times for credit. (P/NP grading only.) GE credit: SE. —S. (S.) Hunter

**98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5)**  
(P/NP grading only.)**Upper Division****101. Introductory Microbiology (5)**

Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 1A, or 2A; Chemistry 2B (may be taken concurrently). Survey of microorganisms emphasizing their interactions with humans and diseases. Topics include microscopy, survey of various microbes, the immune system, food microbiology, microbial pathogens, and mechanisms of disease transmission. Designed for students requiring microbiology for professional schools. Not open for credit to students who have completed courses 102, 102L, 104, or 104L. GE credit: SciEng | SE, SL.

**102. Introductory Microbiology (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 1A or 2A; Chemistry 2B (may be taken concurrently). Essentials of microbial biology, emphasizing phylogeny, physiology, genetics, ecology, and pathogenesis. Interactions with other microbes, humans, and the biosphere. Uses of microbes in agriculture and biotechnology. Not open for credit to students who have completed courses 101 or 104. GE credit: SciEng | QL, SE, SL. —F, W, S. (F, W, S.)

**103L. Introductory Microbiology Laboratory (2)**

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 102 C- or better; Chemistry 2B. Introduction to principles and laboratory methods employed in working with microorganisms. Designed for students requiring microbiology for professional school admission. Not open to students who completed course 101 before Spring 2016, or who have completed courses 102L or 104L.—F, W, S. (F, W, S.) Mann

**104L. General Microbiology Laboratory (3)**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 102 C or better, (Chemistry 8B or 118B or 129A), consent of instructor. Students must complete a petition for consideration of enrollment; petition available on department of Microbiology and Molecular Genetics website. Principles and laboratory methods employed in working with microorganisms. Designed for students continuing in microbiology, genetics, or biochemistry. Only two units of credit for students who completed course 101 before Spring 2016, or who have completed course 103L. Not open to students who have completed course 102L. GE credit: SciEng | SE, WE. —F. (F.) Martin

**105. Microbial Diversity (3)**

Lecture—3 hours. Prerequisite: course 102 or 104, Biological Sciences 101; 103 or 105 strongly recommended. Survey of microbial diversity in the three domains of Life: Bacteria, Archaea, and microbial eukaryotes. Emphasizes microbial evolution and phylogeny, physiology and metabolism, global biogeochemical cycles, environmental adaptations, and genomic methods for analyzing culture-independent microbial diversity and microbial communities. GE credit: SciEng | SE. —W. (W.) Dawson, Parales

**105L. Microbial Diversity Laboratory (3)**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 102 or 104; 102L or 104L; 105 (may be taken concurrently). Students must complete a petition for consideration of enrollment; petition available on department of Microbiology website. Classical enrichments for the isolation of metabolically diverse microbes; modern molecular methods for the identification of isolates; cultivation independent analysis of microbial communities from local environmental samples. GE credit: SciEng | SE, WE. —W. (W.) Dawson, Parales, Ralston

**111. Human Microbiology (3)**

Lecture—3 hours. Prerequisite: course 102; Biological Sciences 101. Biology of microorganisms that form commensal, mutualistic, and pathogenic rela-

tionships with human beings, emphasizing their phylogeny, physiology, genetics, and ecology. Effects on human nutrition, development and physiology.

Mechanisms of pathogenesis, immune response evasion, antibiotic action, and antibiotic resistance. GE credit: SciEng | SE. —F. (F.) Stewart

**115. Recombinant DNA Cloning and Analysis (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 101 or equivalent. Cloning and analysis of recombinant DNA, with emphasis on Escherichia coli host-vector systems. DNA-modifying enzymes; vectors and their use; manipulation and expression of insert DNA; polymerase chain reaction; and sequence annotation. Graduate students see course 215. GE credit: SciEng | SE. —F. (F.) Xu

**120. Microbial Ecology (3)**

Lecture—3 hours. Prerequisite: course 105, Biological Sciences 102 or 105. Interactions between non-pathogenic microorganisms and their environment, emphasizing physiological and metabolic characteristics of various groups and their adaptation to and modification of specific habitats. Offered irregularly. GE credit: SciEng | SE. —Nelson

**140. Bacterial Physiology (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 101, 102, 103 (103 may be taken concurrently), or Biological Sciences 101, 105; Microbiology 102 recommended. Fundamentals of bacterial growth and bacterial responses to environmental stresses. Topics will include carbon and nitrogen regulation, growth rate control, post-exponential growth, and motility and chemotaxis. Not open for credit to students who have completed course 130A. Offered irregularly. GE credit: SciEng | SE.

**150. Genomes of Pathogenic Bacteria (3)**

Lecture—3 hours. Prerequisite: course 102; Biological Sciences 101. Molecular genetics and comparative genomics of representative pathogenic bacteria. Roles of mobile genetic elements, lateral gene transfer, and genome rearrangements in pathogen evolution. Mutation, recombination, and complementation as tools for genetic analysis. Content includes close examination of primary research articles. GE credit: SciEng | SE. —S. (S.) Stewart

**155L. Bacterial Physiology Lab (4)**

Lecture/discussion—1 hour; laboratory—8 hours. Prerequisite: course 140 or 150, 102L, consent of instructor. Physiology and genetics of bacteria. Isolation and characterization of mutant strains. Mapping of mutations by conjugation and transduction studies of control of enzyme synthesis by induction, repression, and catabolite repression. Offered irregularly.

**162. General Virology (4)**

Lecture—4 hours. Prerequisite: Biological Sciences 101; 102 or 105 recommended. Integrated presentation of the nature of animal, bacterial, and plant viruses, including their structure, replication and genetics. Only three units to students who have completed Pathology, Microbiology, and Immunology 128. GE credit: SciEng | SE. —W. (W.)

**170. Yeast Molecular Genetics (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 101; 102 or 105 strongly recommended. Survey of the genetics, cell biology and technologies in yeasts and related lower eukaryotes. Topics include diversity of yeasts; cell structure; metabolism; cell cycle; genetic approaches and genomics; gene expression; yeasts as models to study higher eukaryotes; and contemporary techniques. GE credit: SciEng | SE. —S. (S.) Shiozaki

**175. Cancer Biology (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 101; 102 or 105. Exploration of the causes and treatments of cancer at multiple levels: molecular/cell biology, clinical manifestations, epidemiology and prevention. GE credit: SE, SL. —S. (S.) Privalsky

**190C. Undergraduate Research Conference (1)**

Discussion—1 hour. Prerequisite: upper division standing and consent of instructor, course 199 concurrently. Presentation and critical discussion of staff

research activities: designed for advanced undergraduate students. May be repeated for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

### **191. Introduction to Research for Advanced Undergraduates (1)**

Seminar—1 hour. Prerequisite: Biological Sciences 2A or equivalent. Restricted to upper division standing. Discussion of faculty research focusing on the biochemistry, genetics, and cell biology of microorganisms, along with ways undergraduates can participate in research projects of faculty members. May be repeated three times for credit. (P/NP grading only.) GE credit: SE.—S. (S.) Hunter

### **192. Internship (1-12)**

Internship—3-36 hours. Technical and/or professional experience on or off campus. Supervised by a member of the Microbiology Section faculty. (P/NP grading only.)

### **194H. Microbiology Honors Research (2)**

Independent study—6 hours. Prerequisite: senior standing; eligibility for college honors; completion of six units of 199 in microbiology; consent of section. Continuation of an individual microbiological research project culminating in writing of a senior thesis under a faculty director. (P/NP grading only.)—F, W, S. (F, W, S.)

### **197T. Tutoring in Microbiology (1-12)**

Prerequisite: upper division standing and consent of instructor. Assisting the instructor in one of the section's regular courses by tutoring individual or small groups of students in a laboratory, in voluntary discussion groups, or other voluntary course activities. May be repeated for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S. (F, W, S.)

## **Graduate**

### **200B. Advanced Bacteriology (3)**

Lecture—3 hours. Prerequisite: course 200A. Intended for first year graduate students in microbiology and closely related fields. Advanced topics in phylogeny, physiology, and diversity of bacteria. Offered irregularly.—Dawson, Parales

### **215. Recombinant DNA (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 101, 102, 103 or the equivalent. Application of recombinant DNA technology to modern problems in biology, biochemistry, and genetics, emphasizing molecular cloning strategies, choice of vectors, preparation of insert DNA, and selection procedures.—F. (F.) Privalsky

### **262. Advanced General and Molecular Virology (3)**

Lecture—3 hours. Prerequisite: graduate standing. Advanced integrated presentation of animal, bacterial, and plant viruses, including their structure, modes of regulation, expression and replication, and effects on host cells and organisms. Offered in alternate years.—W. Luciw

### **263. Principles of Protein-Nucleic Acid Interactions (3)**

Lecture—3 hours. Prerequisite: advanced graduate standing and completion of one year of basic graduate course work in biochemistry, biophysics, chemistry, genetics, microbiology, or molecular biology. Physical basis of protein-nucleic acid interaction. Topics include nucleic acid recognition by proteins, thermodynamics of protein-nucleic acid stability, and kinetics of binding process for both non-specific and sequence-specific nucleic acid binding proteins. Emphasis on systems that represent paradigms in protein-nucleic acid interactions. Offered irregularly.—Kowalczykowski

### **274. Seminar in Genetic Recombination (1)**

Seminar—1 hour. Prerequisite: graduate standing; consent of instructor. Biochemical and genetic aspects of genetic recombination in prokaryotes and eukaryotes. Mechanisms of recombination and biochemical and genetic characteristics of recombination proteins. Proteins include DNA strand exchange, DNA helicases, and Holliday junction resolving proteins. May be repeated for credit. (S/U grading only.) Offered irregularly.—Kowalczykowski

### **275. Seminar in DNA Repair and Recombination (1)**

Seminar—1 hour. Prerequisite: consent of instructor; graduate standing in Microbiology or closely related field. Review and discussion of current research and literature in DNA repair and recombination with presentations by individual students and invited speakers. May be repeated for credit. (S/U grading only.)—W, S. (F, S.) Heyer

### **276. Advanced Concepts in DNA Metabolism (3)**

Lecture—3 hours. Prerequisite: Molecular and Cellular Biology 221C or Genetics 201C or equivalent course recommended. DNA damage checkpoints, homologous recombination, and meiotic recombination. An advanced treatment of the clinical and current literature to discuss emerging principles and current models in these research areas. Offered in alternate years.—(W) Hunter

### **290C. Advanced Research Conference (1)**

Discussion/conference—1 hour. Prerequisite: graduate standing and/or consent of instructor. Presentation and critical discussion of staff research activities. Designed for advanced graduate students. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

### **291. Selected Topics in Microbiology (1)**

Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Current progress in microbiology and cellular and molecular biology. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

### **292. Seminar in Bacterial Physiology and Genetics (1)**

Seminar—1 hour. Prerequisite: consent of instructor, graduate standing in microbiology or closely related field. Review and discussion of current research and literature in bacterial physiology and genetics, with presentations by individual students. (S/U grading only.)—F, W, S. (F, W, S.)

### **298. Group Study (5)**

Prerequisite: consent of instructor. (S/U grading only.)—F, W, S. (F, W, S.)

### **299. Research (1-12)**

(S/U grading only.)—F, W, S. (F, W, S.)

## **Professional**

### **396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## **Microbiology (A Graduate Group)**

Renée M. Tsolis, Ph.D., Chairperson of the Group

**Group Office.** 3143 Tupper Hall (Medical: Microbiology and Immunology)  
530-752-0262

## **Faculty**

David Asmuth, M.D., Ph.D., Assistant Professor (*UCDHS: Infectious Diseases, Div. of*)  
Shota Atsumi, Ph.D., Associate Professor (*Chemistry*)  
Enoch P. Baldwin, Ph.D., Associate Professor (*Molecular and Cellular Biology*)  
Nicole Baumgarth, D.V.M., Ph.D., Professor (*Center for Comparative Medicine*)  
Andreas Bäumler, Ph.D., Professor (*Medical Microbiology and Immunology*)

Alison M. Berry, Ph.D., Professor

(*Plant Sciences*)

Charles L. Bevins, Ph.D., Professor

(*Medical Microbiology and Immunology*)

Linda F. Bisson, Ph.D., Professor

(*Viticulture and Enology*)

Barbara A. Byrne, D.V.M., Ph.D., Associate Professor (*Pathology, Microbiology, and Immunology*)

Kiho Cho, Ph.D., Associate Professor (*Surgery and Pediatric Regenerative Medicine*)

Gitta Coaker, Ph.D., Associate Professor (*Plant Pathology*)

Sean R. Collins, Ph.D., Assistant Professor (*Microbiology & Molecular Genetics*)

Patricia A. Conrad, Ph.D., Professor (*Pathology, Microbiology, and Immunology*)

Satya Dandekar, Ph.D., Professor (*Medical Microbiology and Immunology*)

Scott Dawson, Ph.D., Associate Professor (*Microbiology & Molecular Genetics*)

Jonathan Eisen, Ph.D., Professor (*Evolution & Ecology and Medical Microbiology & Immunology*)

Bryce Falk, Ph.D., Professor (*Plant Pathology*)

Julia Fan, Ph.D., Associate Professor (*Biological & Agricultural Engineering*)

Mélanie Gareau, Ph.D., Assistant Professor (*Anatomy, Physiology & Cell Biology*)

Angela Gelli, Ph.D., Associate Professor (*Pharmacology and Toxicology*)

Dennis Hartigan-O'Connor, M.D., Ph.D., Assistant Professor (*Medical Microbiology & Immunology*)

Volkmar Heinrich, Ph.D., Associate Professor (*Biomedical Engineering*)

Matthias Hess, Ph.D., Assistant Professor (*Animal Science*)

Wolf-Dietrich Heyer, Ph.D., Professor (*Microbiology & Molecular Genetics*)

Neil Hunter, Ph.D., Professor (*Microbiology & Molecular Genetics*)

Michele M. Igo, Ph.D., Professor (*Microbiology & Molecular Genetics*)

Stephen C. Kowalczykowski, Ph.D., Professor (*Microbiology & Molecular Genetics*)

Johan Leveau, Ph.D., Associate Professor (*Plant Pathology*)

Su-Ju Lin, Ph.D., Professor (*Microbiology & Molecular Genetics*)

Bo Liu, Ph.D., Professor (*Plant Biology*)

Frank Loge, Ph.D., Professor (*Civil and Environmental Engineering*)

Paul Luciw, Ph.D., Professor (*Medical Pathology*)

Shirley Luckhart, Ph.D., Professor (*Medical Microbiology and Immunology*)

Maria Marco, Ph.D., Associate Professor (*Food Science & Technology*)

Stephen J. McSorley, Ph.D., Professor (*Anatomy, Physiology & Cell Biology*)

John C. Meeks, Ph.D., Professor Emeritus (*Microbiology & Molecular Genetics*)

Christopher J. Miller, Ph.D., Professor (*Pathology, Microbiology, and Immunology*)

David A. Mills, Ph.D., Professor (*Viticulture and Enology*)

Lorena Navarro, Ph.D., Assistant Professor (*Microbiology & Molecular Genetics*)

Douglas C. Nelson, Ph.D., Professor Emeritus (*Microbiology & Molecular Genetics*)

Rebecca E. Parales, Ph.D., Professor (*Microbiology & Molecular Genetics*)

Niels C. Pedersen, Ph.D., Professor (*Medicine and Epidemiology*)

Martin L. Privalsky, Ph.D., Professor (*Microbiology & Molecular Genetics*)

Katherine S. Ralston, Ph.D., Assistant Professor (*Microbiology & Molecular Genetics*)

Jorge Rodrigues, Assistant Professor (*Land, Air and Water Resources*)

Pamela Ronald, Ph.D., Professor (*Plant Pathology*)

John R. Roth, Ph.D., Professor (*Microbiology & Molecular Genetics*)

Jeroen Saeij, Ph.D., Associate Professor (*Pathology, Microbiology and Immunology*)

Michael A. Savageau, Ph.D., Professor  
(*Biomedical Engineering*)  
Lark Schneider, Ph.D., Assistant Professor  
(*Pathology, Microbiology & Immunology*)  
Barbara L. Shacklett, Ph.D., Professor  
(*Medical Microbiology and Immunology*)  
Mitchell H. Singer, Ph.D., Professor  
(*Microbiology & Molecular Genetics*)  
Carolyn Slupsky, Ph.D., Professor (*Nutrition*)  
Woutrina A. Smith, Ph.D., Associate Professor  
(*Pathology, Microbiology, and Immunology*)  
Jay V. Solnick, M.D., Ph.D., Professor  
(*Internal Medicine*)  
Esteban Soto-Martinez, Ph.D., Assistant Professor  
(*Veterinary Medicine & Epidemiology*)  
Jeffrey L. Stott, Ph.D., Professor  
(*Pathology, Microbiology, and Immunology*)  
Dawn Sumner, Ph.D., Professor  
(*Earth and Planetary Sciences*)  
Ilias Tagkopoulos, Ph.D., Assistant Professor  
(*Computer Science*)  
George Thompson, M.D., Assistant Professor  
(*Medical Microbiology & Immunology*)  
Jose V. Torres, Ph.D., Professor  
(*Medical Microbiology and Immunology*)  
Renée M. Tsolis, Ph.D., Professor  
(*Medical Microbiology and Immunology*)  
Bart Weimer, Ph.D., Professor  
(*Population Health & Reproduction*)  
Stefan Wuertz, Ph.D., Professor  
(*Civil and Environmental Engineering*)  
Lifeng Xu, Ph.D., Assistant Professor  
(*Microbiology & Molecular Genetics*)  
Tilahun D. Yilma, Ph.D., Professor  
(*Pathology, Microbiology, and Immunology*)  
Glenn M. Young, Ph.D., Professor  
(*Food Science and Technology*)  
Huaijun Zhou, Ph.D., Associate Professor  
(*Animal Science*)

### Affiliated Faculty

Kathryn DeRiemer, Ph.D., MPH, Adjunct Associate Professor (*Medical Microbiology & Immunology*)  
Patrick S. C. Leung, Ph.D., Adjunct Professor  
(*Internal Medicine*)  
Ellen E. Sparger, D.V.M., Ph.D., Associate Adjunct Professor (*Veterinary Medicine and Epidemiology*)

**Graduate Study.** The Graduate Group in Microbiology offers study and research leading to the M.S. and Ph.D. degrees. Strong preference is given to doctoral applicants. The group offers study in modern molecular approaches to microbiological problems. Areas of research span fundamental, applied, and pathogenic microbiology, including bacterial and viral pathogenesis, eukaryotic microbiology, microbial genomics and genetics, microbial physiology and development, microbial ecology and environmental microbiology, cancer biology, and bioengineering and bioremediation. For information on the graduate study and undergraduate preparation for the program contact a graduate adviser or the Chairperson of the Group.

**Graduate Advisers.** S.C. Dawson (*Microbiology & Molecular Genetics*), L.F. Bisson (*Viticulture and Enology*), R.E. Parales (*Microbiology & Molecular Genetics*), E.E. Sparger (*Vet Med: Medicine*), R. Tsolis (*Med:Microbiology & Immunology*), B. Weimer (*VM:Pop Health & Repro*)

### Courses in Microbiology (MIB)

#### Graduate

##### 200A. Microbial Biology (3)

Lecture—3 hours. Prerequisite: course Microbiology 102 or equivalent; prior coursework in Microbiology. Designed to provide an overview of various aspects of microbiology and microbial processes. Topics will include microbial genetics and genomics, microbial metabolism, signaling, and adaptations.—F. (F.) Weimer

##### 201L. Advanced Microbiology Laboratory Rotations (5)

Laboratory—15 hours. Two five-week assignments in microbiology research laboratories. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated two times for credit.—F, W, S. (F, W, S.)

##### 210. Microbial Interactions (2)

Lecture—2 hours. Prerequisite: course 200A or consent of instructor. Analysis at the molecular level of the interactions of microbes with the environment, microbes with other microbes, and microbes in symbiotic and/or pathogenic associations with eukaryotic hosts. Topics discussed will vary. May be repeated two times for credit.—F, W, S. (F, W, S.)

##### 290C. Advanced Research Conference (1)

Discussion/conference—1 hour. Prerequisite: graduate standing and/or consent of instructor. Presentation and critical discussion of staff research activities. Designed for advanced graduate students. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

##### 299. Research (1-12)

Research under the guidance of dissertation committee. (S/U grading only.)

## Middle East/South Asia Studies

(College of Letters and Science)

Smriti Srinivas, Ph.D, Program Director

**Program Office.** 1272 Social Science & Humanities 530-754-4926; <http://mesa.ucdavis.edu>

#### Committee in Charge

Ali Anooshahr, Ph.D. (*History*)  
Flagg Miller, Ph.D. (*Religious Studies*)  
Jocelyn Sharlet, Ph.D. (*Comparative Literature*)  
Noha Radwan, Ph.D. (*Comparative Literature*)  
Smriti Srinivas, Ph.D. (*Anthropology*)  
Suad Joseph, Ph.D. (*Anthropology, Women and Gender studies*)  
Sudipta Sen, Ph.D. (*History*)  
Susan Miller, Ph.D. (*History*)

#### The Major Program

A study of the Middle East and South Asia as a whole allows students to explore a unique set of issues of both historical and contemporary importance. In order to guide students in comparative analysis, faculty help majors deepen their inquiries through coursework on antique, medieval, and early modern empires and political systems. Given the dynamism of modern cultural contexts, majors are invited to concentrate their studies on a wide range of variables including the evolution of states along with new understandings of citizenship, the rise and development of nationalist movements, political conflicts informed by religious majorities, the nuclearization of India and Pakistan, the growth of information societies and computer industries, the production of oil and its social and cultural legacies, labor migrations, urbanization, the emergence of sizeable middle classes, transnational literary movements using sophisticated media technologies, the expansion and intrusion of global security regimes into everyday life, and peace initiatives that shape struggles for justice across the world. Our program's focus on both the Middle East and South Asia is a pioneering achievement in the United States rivaled by only four other colleges or universities.

By the end of their studies, majors will have acquired an in-depth understanding of the common historical experience shared by many peoples in these regions, and of the legacies of culture, social exchange, power and empowerment across diverse settings. Students are also required to complete at

least two years of training in a language appropriate to their area of expertise.

The major in Middle East/South Asia Studies at UC Davis offers a unique opportunity to study exchanges, complementarities, and correspondences in such fields as history, political economy, culture, literature and film, religion, family structures, gender relations, media, anthropology, law, international relations, development, diasporas, and urbanism. Students who complete our major will be well suited to embark on careers in non-governmental organizations, journalism and media industries, education and research, governmental service and diplomacy, and business.

**Programs, Internships, and Career Alternatives.** Many internship opportunities are available for the Middle East/South Asia Studies major and minor, consult with your adviser.

#### Middle East/South Asia Studies Abroad

**Program.** University of California Education Abroad Program. More information can be found at <http://eap.ucop.edu/> and <http://summer-abroad.ucdavis.edu/>.

#### A.B. Major Program Requirements:

**Preparatory Subject Matter .....** **8-38**

History 6, 8 ..... 8

Two years (or the equivalent) of Arabic, Hebrew, or Hindi/Urdu (other Middle East/South Asia Studies regional languages accepted with petition). Arabic 1, 2, 3, 21, 22, 23; Hebrew 1, 2, 3, 21, 22, 23; Hindi/Urdu 1, 2, 3, 21, 22, 23 ..... 30

**Depth Subject Matter.....** **40-42**

Middle East/South Asia Studies 100 ..... 4

Middle East/South Asia Studies 180 ..... 4

Two courses from: Anthropology 142; Comparative Literature 166; History 113, 190A, 190B, 190C, 193A, 193B; Political Science 135, 136; Religious Studies 160, 162; Women's Studies 178A, 184 ..... 8

Two courses from: Anthropology 145; History 102Q, 196A, 196B; Religious Studies 170; Women's Studies 178B ..... 8

Additional Electives from Core Course list (below) ..... 16-18

**Total Units for Major .....** **48-80**

#### Core Course List:

Anthropology 142, 145; Arabic 1, 2, 3, 21, 22, 23; Art History 1E, 155; Asian American Studies 150F, 189E; Classics 1; Comparative Literature 53B, 53C, 166; Hebrew 1, 2, 3, 21, 22, 23; Hindi/Urdu 1, 2, 3, 21, 22, 23; History 102Q, 102R, 113, 190A, 190B, 190C, 193A, 193B, 196A, 196B; Middle East/South Asia Studies 92, 98, 99, 180, 192, 198, 199; Music 129B, 148; Political Science 135, 136; Religious Studies 21, 23, 60, 65C, 68, 160, 161, 162, 170; Women's Studies 178A, 178B, 184.

Note: With prior consultation with an adviser, students can petition in the Program Committee in advance to accept other elective courses toward the major program, including language courses.

Note: While some courses are identified as fulfilling more than one requirement, a given course can only fulfill one such requirement.

Restriction: No more than six units of MSA 92, 98, 99, 192, 198, 199 may be offered in satisfaction of the major requirements. However, students must have completed at least 40 units of upper division course work in satisfaction of the major requirements.

**Major adviser.** Consult the Middle East/South Asia Studies Program in 155 Kerr Hall 530-754-4926 or the Middle East/South Asia Studies website at <http://mesa.ucdavis.edu>.

## Arab Studies Minor Program Requirements:

The minor in Arab Studies covers an area of utmost historical, cultural, economic and geopolitical significance. Several key contemporary issues make the region as a whole a focus of interest for scholarly study. The Arab Studies minor is an interdisciplinary minor open to undergraduates in all four colleges.

UNITS

### Arab Studies.....20-24

Middle East/South Asia 100 .....	4
Middle East/South Asia 180 .....	4
Choose one from: History 193A or History 193B.....	4
Choose one from: Middle East/South Asia 181C or 182C .....	4
Additional Electives from Core Course list (below) .....	4-8
Core Course List:	
Middle East/South Asia 111A, 121A/ARB 140, 122A, 150/Women's Studies 185, 181C, 182C; Anthropology 142; Arabic 1/1A, 2, 3, 21, 22, 23, 121, 122, 123, 198; Art History 155; Comparative Literature 53C, 155, 166; History 6, 102 R, 112 C, 115 F, 190A, 190B, 190C, 193A, 193B; Political Science 135, 136; Religious Studies 60, 65C, 160, 161, 162, 163, 167; Women's Studies 178A, 184.	

With prior consultation with an adviser, students can petition in advance the Program Committee to accept other elective courses toward the minor program if the content is 50% or more on the Arab World. Under no circumstances may more than one lower division course be offered in satisfaction of requirements for the minor.

With prior consultation with an adviser, students can petition the Program Committee to accept more than four units of Middle East/South Asia 181C and/or Middle East/South Asia 182C towards the minor program.

## India & South Asia Studies Minor Program Requirements:

The minor in India & South Asia Studies covers an area of immense historical, cultural, economic, demographic, and geopolitical significance. The minor is designed to emphasize the interconnected and comparative aspect of history, culture, society, economy, religion, gender relations, media, law, political economy, international relations, urbanism, migration and diaspora, language and literatures across regional and national boundaries. It is an interdisciplinary minor open to undergraduates in all four colleges.

UNITS

### India & South Asia Studies.....20-24

Middle East/South Asia 100 .....	4
Middle East/South Asia 180 .....	4
Choose one from: History 196A or History 196B.....	4
Choose one from: Middle East/South Asia 181B or 182B .....	4
Additional Electives from Core Course list (below) .....	4-8
Core Course List:	
Middle East/South Asia 112, 181B, 182B; Anthropology 145; Asian American Studies 150F; Comparative Literature 53B, 148, 156; Hindi 1, 2, 3, 21, 22, 23; History 8, 102Q, 196A, 196B; Music 148; Religious Studies 30, 68, 69, 156, 157.	

With prior consultation with an adviser, students can petition in advance the Program Committee to accept other elective courses toward the minor program if the content is 50% or more on the Indian & South Asian World. Under no circumstances may more than one lower division course be offered in satisfaction of requirements for the minor.

With prior consultation with an adviser, students can petition the Program Committee to accept more than four units of Middle East/South Asia 181B and/or Middle East/South Asia 182B towards the minor program.

## Iran & Persian Studies Minor Program Requirements:

The Iran & Persian Studies minor offers students courses on history and culture in the Iran & Persian world during the early modern and modern periods. It is an interdisciplinary minor open to undergraduates in all four colleges

UNITS

### Iran & Persian Studies .....20-24

Middle East/South Asia 100 .....	4
Middle East/South Asia 180 .....	4
Choose one from: History 190D or History 190D .....	4
Choose one from: Middle East/South Asia 181A or 182A .....	4
Additional Electives from Core Course list (below) .....	4-8
Core Course List:	
Middle East/South Asia 131A/Cinema & Technocultural Studies 146A, Middle East/South Asia 151A, 181A, 182A, Comparative Literature 155, History 190D, 193D.	

With prior consultation with an adviser, students can petition in advance the Program Committee to accept other elective courses toward the minor program if the content is 50% or more on the Iranian and Persian World. Under no circumstances may more than one lower division course be offered in satisfaction of requirements for the minor.

With prior consultation with an adviser, students can petition the Program Committee to accept more than four units of Middle East/South Asia 181A and/or Middle East/South Asia 182A towards the minor program.

## Middle East/South Asia Studies Minor Program Requirements:

UNITS

### Middle East/South Asia Studies.....20-24

Middle East/South Asia Studies 100 .....	4
Choose one course from: Anthropology 142; Asian American Studies 189E; Comparative Literature 166; History 113, 190A, 190B, 190C, 193A, 193B; Music 129B; Religious Studies 160, 161, 162; Women's Studies 178A, 184 .....	4
Choose one course from: Anthropology 145; Asian American Studies 150F, 189E; History 102Q, 196A, 196B; Music 129B, 148; Religious Studies 168, 170; Women's Studies 178B.....	4
Additional Electives from Core Course list for major (above) .....	8-12

Note: With prior consultation with an adviser, students can petition the Program Committee in advance to accept other elective courses toward the minor program. Under no circumstances may more than one lower division course be offered in satisfaction of requirements for the minor.

Note: With prior consultation with an adviser, students can petition the Program Committee to accept more than four units of Middle East/South Asia Studies 192, 198, and/or 199 towards the minor program.

Note: While some courses are identified as fulfilling more than one requirement, a given course can only fulfill one such requirement.

**Minor Adviser.** Consult the Middle East/South Asia Studies Program in 155 Kerr Hall 530-754-4926 or the Middle East/South Asia Studies website <http://mesa.ucdavis.edu>.

## Courses in Middle East/South Asia Studies (MSA)

### Lower Division

#### 92. Internship in Middle East/South Asia Studies (3-15)

Internship. Prerequisite: consent of instructor. Work experience on and off campus in all subject areas offered as part of the ME/SA Studies program. Internship supervised by a member of the ME/SA faculty. May be repeated for credit up to 15 units. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

#### 98. Directed Group Study (1-5)

Prerequisite: consent of instructor (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

#### 99. Special Study for Undergraduates (1-5)

Prerequisite: consent of instructor (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

### Upper Division

#### 100. Middle East and South Asia: Comparative Perspectives (4)

Lecture—3 hours; extensive writing. Ethnographic and historical points of intersection and divergence in various aspects of the Middle East and South Asia in precolonial, colonial, and postcolonial societies. Anthropological, historical, and theoretical debates surrounding the region. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.—F, W, S. (F, W, S.)

#### 111A. Great Cities of Arab Middle East and South Asia (4)

Lecture—3 hours; extensive writing. Prerequisite: some knowledge of Islamic/Middle Eastern history is very useful; consent of instructor. In-depth examination of the great cities of North Africa, the Middle East and South Asia as cultural and historical artifacts. Topics include: the concept of the Islamic city, processes of modernity, and representations that reinforce imagination, memory and personal identity. Offered irregularly. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.—F, W, S. (W) Miller, Susan

#### 112. History of South Asian Islam (4)

Lecture—3 hours; discussion—1 hour. Comparative study of Muslim communities of South Asia. Commonalities in cultural identity and historical experience. Rise and spread of Islam, comparative history of Islamic Empires, colonial rule, and post-colonial nationalism.—W. (W) Sen, Sudipta

#### 121A. Shahnameh: The Persian Book of Kings (4)

Lecture/discussion—3 hours; term paper. In-depth analysis of the Persian Book of Kings (Shahnameh) by Abu al-Qasim Ferdowsi (d. 1020 CE) in its historical context with a comparative perspective on the role of this work in Persian and world literature. (Same course as Comparative Literature 175.) Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Jocelyn, Sharlet

#### 121C. A Story for a Life: The Arabian Nights (4)

Lecture/discussion—3 hours; term paper. In-depth exploration of The Arabian Nights, the best-known work of pre-modern Arabic literature and a major work of world literature. Analysis of the work in its historical context and in comparison to other frame tales in world literature. (Same course as Comparative Literature 172 and Arabic 140.) Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Radwan, Sharlet

#### 122A. Themes in the Arabic Novel (4)

Lecture/discussion—3 hours; independent study; extensive writing. Class size limited to 30 students. Select modern Arabic fiction (novels and short stories) in translation. Thematically connected readings supplemented by non-fictional writings when appropriate. May be repeated two times for credit if the texts/theme of required course readings sufficiently change. Offered in alternate years. GE credit: ArtHum | AH, OL, WC, WE.—F, Su. (F, Su.) Noha, Radwan

**131A. Modern Iranian Cinema (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: upper-division standing, or consent of instructor. Iranian cinema of the 20th century in the context of profound cultural and social changes in Iran especially since the Iranian Revolution. Productions by representative directors such as Kiarostami, Makhmalbaf, Bahram Beizaie are included. Knowledge of Persian not required. (Same course as Cinema & Technocultural Studies 146A.) Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, OL, VL, WC, WE.—S. (S.)

**131C. Religion and Media in Arab World (4)**

Lecture—4 hours. Exploration of the role and experience of media technologies in the Arab world. Study of digital and electronic media as well as alternative media practices. Investigation of new trends in political activism and identity formation. (Same course as Religious Studies 166.) Offered in alternate years. GE credit: SocSci | OL, SS, VL, WC, WE.—Miller, Flagg

**150. Women and Islamic Discourses (4)**

Lecture/discussion—4 hours. Prerequisite: Women's Studies 50 or comparable course. Introduction to the debates/discourses about women and Islam. Transformations in debates/discourses in colonial and postcolonial periods in the Middle East & South Asia. Comparative study of debates/discourses on family, work, law, sexuality, religion, comportment, human rights, feminist and religious movements. (Same course as Women's Studies 185.) Offered irregularly. GE credit: ArtHum or SocSci | AH or SS, WC.

**151A. Iranian Society & Culture (4)**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: some knowledge of Islamic/Middle Eastern history is very useful; consent of instructor. In-depth investigation of modern Iranian society and culture. Exploration of structures of Iranian society: family, gender, religion, minorities, economy, politics, and state. Iran's role in the globalizing world, and the role of Iranian diasporas. Offered in alternate years. GE credit: ArtHum | AH, OL, VL, WC, WE.—S. (S.)

**180. Topics in Middle East and South Asian Studies (4)**

Lecture—3 hours; extensive writing. Comparative perspective on the Middle East and South Asia. Topics may include modernity, religious traditions, colonialism, subalternity and social movements, gender and sexuality, history and memory, science and development, ritual and performance, public culture, diasporas. May be repeated one time for credit. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.—F, W, S. (F, W, S.)

**181A. Topics in Regional ME/SA Studies (4)**

Lecture—3 hours; term paper. Iran & Persian topics for students specializing in region-specific Middle East and South Asia Studies. May be repeated three times for credit. GE credit: ArtHum or SocSci | AH or SS, WC, WE.

**181B. Topics in Regional ME/SA Studies (4)**

Lecture—3 hours; term paper. Indian/South Asia topics for students specializing in region-specific Middle East and South Asia Studies. May be repeated three times for credit. GE credit: ArtHum or SocSci | AH or SS, WC, WE.

**181C. Topics in Regional ME/SA Studies: Arab Studies (4)**

Lecture—3 hours; term paper. Arab Studies topics. May be repeated three times for credit when different topics and themes are studied. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS.—S. (S.)

**182A. Undergraduate Proseminar in Middle East/South Asia (4)**

Seminar—3 hours; term paper. Prerequisite: course 100 recommended. Class size limited to 15 students. Seminar in Iran & Persian topics specializing in region-specific Middle East and South Asia studies. May be repeated three times for credit.—W. (W.)

**182B. Undergraduate Proseminar in Middle East/South Asia (4)**

Seminar—3 hours; term paper. Prerequisite: course 100 recommended. Class size limited to 15 students. Seminar in India/South Asia topics specializing in region-specific Middle East and South Asia studies. May be repeated three times for credit when different topics and themes are studied.—W. (W.)

**182C. Undergraduate Proseminar in Middle East/South Asia: Arab Studies (4)**

Seminar—3 hours; term paper. Prerequisite: course 100 recommended. Class size limited to 15 students. Seminar in Arab Studies topics. May be repeated three times for credit. GE credit: WE.—S. (S.)

**192. Internship (1-12)**

Internship—3-36 hours. Prerequisite: course 100. Supervised internship on and off campus in the area of Middle East and South Asia Studies. May be repeated for up to 12 units of credit. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

**194H. Special Study for Honors Students (1-5)**

Prerequisite: open only to majors of senior standing who qualify for honors program; consent of instructor. Independent study of a problem in Middle East/South Asian studies involving the writing of an honors thesis.—F, W, S. (F, W, S.)

**198. Directed Group Study (1-5)**

Prerequisite: course 100. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

**199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: course 100. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

## Military Science

(College of Letters and Science)

**Reserve Officers' Training Corps (ROTC), Army**

Brian Knieriem, Lt. Col., Chairperson of the Department

**Department Office.** 125 Hickey Gymnasium  
530-752-5211

**Faculty**

Lt. Col. Brian Knieriem, Professor  
Captain Nicholas Olson, Assistant Professor  
Captain Tonya Sottilo, Assistant Professor  
Captain Gary Suen, Assistant Professor

**Program of Study**

The Military Science Department offers hands-on training in management and leadership. The program stresses the following Army Values: loyalty, duty, respect, selfless-service, honor, integrity, and personal courage. The program also stresses leadership dimensions as taught in the classes. Also stressed are current events, national and international politics, military affairs, ethics training, and human relations with emphasis on eliminating racial and gender discrimination. Management and leadership are taught using the U.S. Army as a model. Military skills (such as drill and ceremony, map reading, and squad tactics) are taught to the extent necessary to create an environment where students can enter leadership positions and apply theories taught in the classroom. Students learn by doing. The program assists students in all academic fields to prepare for positions of leadership in military or civilian careers.

The department offers two program tracks: (1) a purely academic track; (2) a pre-commissioning track for those desiring a commission in the U.S. Army. The academic track entails no obligation to the military and is open to all students. Students pursuing the academic track do not wear a uniform or otherwise participate in extra-curricular activities designed as part of the pre-commissioning process.

Activities for all students include the Ranger Club (a club designed for adventure activities such as rappelling, white-water rafting, orienteering, and patrolling) and intramural sports teams.

Students who desire a commission in the U.S. Army participate in both the academic portion of the program and in the leadership laboratories and extracurricular activities designed to enhance their leadership and technical skills. They wear uniforms to leadership laboratories and selected classes and become ROTC cadets. Students may be cadets in the lower division courses without incurring a military obligation. Students participating in the upper division pre-commissioning program incur a military obligation. See below for details. Extra-curricular activities for cadets include an intercollegiate sports team (Ranger Challenge), the university color guard, a military honor society, and opportunities to participate in field training exercises.

**Department Programs**

Students are enrolled in Military Science under one of two programs.

**Four-Year Program**

There is no military obligation associated with attendance in lower division courses. Students are enrolled in the basic course (lower division) for the first two years on a voluntary basis. Admission to the advanced course (upper division) is by application from second-year lower division students who meet the academic, physical, and military aptitude requirements. Qualified veterans can enter the advanced course immediately because of their military service experience, upon approval by the Department Chairperson.

Juniors receive \$450 subsistence per month, and Seniors \$500 per month, after executing a contract agreeing to complete the courses and accept a commission in the U.S. Army upon graduation. During the course, all Military Science text books, uniforms and equipment are provided without cost. Students are given leadership development experience at the Leader Development and Assessment Course (LDAC) between their third and fourth years of the course. Emphasis is on individual participation, leadership development and the capability to function effectively in positions of significant responsibility.

**Two-Year Program**

The two-year program is for students, including graduate students, who have not attended lower division Military Science classes. In lieu of lower division courses an applicant attends a six-week summer program, Leaders Training Course (LTC) which is voluntary and carries no military obligation. Applicants are paid and transportation costs covered. Applications are accepted at anytime prior to the student's junior year; graduate students are also accepted. All other provisions explained above for the upper division course apply to the two-year program.

**Scholarship Program**

The U.S. Army offers four-, three-, and two-year Active Duty scholarships, two-year Reserve Forces Duty, and two-year Dedicated National Guard scholarships to students planning to attend or attending UC Davis. The U.S. Army ROTC scholarship package pays tuition. Also included in all scholarships is a flat rate of \$1200 per year for textbooks.

The Army Reserve Officers' Training Corps four-year Active Duty merit scholarships are awarded to qualified high school seniors in a national competition each year. A deadline of 10 January is set for submission of the four-year scholarship application. As high school seniors, students compete for the scholarship by submitting their complete application at <http://www.goarmy.com/rotc/> or contact UC Davis, Department of Military Science at 530-754-6707.

The three-year Active Duty and two-year Reserve Forces Duty scholarships are awarded to college students who are already attending UC Davis or transferring from a junior college to UC Davis. Students

apply for and are awarded these Army scholarships through the Military Science Department.

### Leadership Laboratory

During the course of the school year, two hours per week are spent conducting practical exercises. Classes emphasize adventure activities including offense, defense and patrolling techniques, weapons familiarization, rappelling, rope bridging, obstacle courses, leadership reaction course, and land navigation. All cadets are required to attend leadership laboratories for practical leadership experience and to prepare for attendance at LDAC, held at Fort Lewis, Washington.

### Academic Credit

#### College of Agricultural and Environmental Sciences.

The Bachelor of Science degree in agriculture requires the completion of 180 units. Military Science courses are counted in the unit allowance for electives.

**College of Biological Sciences.** The Bachelor of Science degree requires the completion of 180 units. Military Science courses are counted in the allowance for electives.

**College of Engineering.** Military Science units are acceptable toward the requirements for the Bachelor of Science degree to the extent of the unrestricted elective units available in the curriculum being followed.

**College of Letters and Science.** The Bachelor of Arts degree requires the completion of 180 units. Military Science courses are counted in the allowance for electives.

**School of Veterinary Medicine.** The number of Military Science units acceptable toward the Bachelor of Science degree in Veterinary Medicine is on an individual program basis approved by the Dean of the School. Graduates with the D.V.M. degree may apply for direct commission in the United States Army Veterinary Corps.

### Aerospace Studies (Air Force)

The Air Force Reserve Officer's Training Corps (AFROTC) is an educational program providing training in leadership, management, communications and military proficiency on college and university campuses. It also provides an opportunity to obtain a commission as a second lieutenant in the Air Force and enter the active duty forces after you complete a bachelor's or a graduate degree. The skills you acquire will become valuable assets for any subsequent career you choose.

The program is normally four years long, but a flexible design allows students to complete the curriculum in as little as two years. Undergraduate scholarships are available, but are not necessary for participation. Until you accept a scholarship or enter your junior year of the program, you have no obligation to join the Air Force. There are no costs for AFROTC uniforms, books, or classes.

UC Davis students have the option of taking the Air Force program on the UC Berkeley or CSU Sacramento campus.

### Qualifications

Freshmen/Sophomore applicants must:

- Be full-time college students in good academic standing
- Have good moral character
- Be in strong physical condition
- Be at least 14 years old

Additionally, Juniors/Seniors/Scholarship recipients must:

- Be United States citizens or in the process of applying for citizenship
- Be 18 years old (or 17 years old with consent of parent or guardian)
- Pass the Air Force Officer Qualifying Test
- Pass a medical examination

- Be under the age of 31 at time of graduation (may be waived)

### Scholarships

Opportunities for four-year and three-year undergraduate scholarships are better than ever. Scholarships cover the full cost of tuition, books and required fees at the University of California and are available for eligible high school seniors. It also includes \$300-\$500 monthly stipend during the school year. If you are a junior or senior in high school and plan on attending a college or university in Northern California, you can write, call or visit the local AFROTC detachments for a scholarship application. Applications are also available from local Air Force recruiters or your high school guidance counselors.

All scholarships are merit-based and consider a variety of factors: cumulative GPA, class standing, SAT/ACT scores, academic awards/achievements, leadership ability, athletic involvement, extracurricular activities, community service and letters of recommendation. A personal interview with an Air Force officer is also part of the application process. Prior to activating a scholarship, students must meet AFROTC medical and physical fitness standards. All scholarships must be used at an accredited college or university that offers AFROTC on campus or through cross-registration. The program is available at more than 1,000 universities and colleges nationwide.

If you are already in college, contact our office directly and apply for enrollment into AFROTC as a cadet. Three- and two-year full tuition scholarships are available for all academic majors, especially scientific and technical majors such as engineering, atmospheric science, math, computer science, and physics. GPA Scholarship requirements for nontechnical majors are slightly higher. Applicants are primarily evaluated on their leadership ability and academic performance.

### Challenging Careers

All commissioned officers enter the Air Force as second lieutenants for a 4-year active duty service commitment. Pilots and navigators serve longer commitments, based on training requirements. Once on active duty, you'll be given instant responsibility in one of 32 primary career fields. Opportunities to fly are better than ever. Whether you are piloting the F-22 fighter, supervising 150 aircraft maintainers on the flightline, or caring for sick personnel in the emergency room, you will be rewarded knowing that you are making a difference.

Air Force ROTC is offered through the Aerospace Studies departments at California State University Sacramento and U.C. Berkeley. Scholarships (including tuition, book allowance, and stipend) are available for qualified students. Students may enroll and attend one course per semester at the U.C. Berkeley or CSU Sacramento campus at no cost. Topics covered in AFROTC courses include Basic Military knowledge (1-credit), Military History (1-credit), Leadership Training (3-credits), and U.S. National Security Affairs and Preparation for Active Duty (3-credits). Additional components of the AFROTC program include 2 hours per week of fitness activities, 2 hours per week of Leadership Lab, and a 4-week Summer Field Training between the Sophomore and Junior years. Upon completion of the program and granting of 4-year degree, students will commission as Second Lieutenants in the United States Air Force. To be eligible for AFROTC, applicants should be a full time student and meet additional fitness, GPA, testing, and other requirements. Interested students, please contact their department of choice:

For CSU Sacramento: <http://www.csus.edu/afrotc> 916-278-7315; [dei088@maxwell.af.mil](mailto:dei088@maxwell.af.mil)

For U.C. Berkeley: <http://airforcerotc.berkeley.edu> (510) 642-3572; [airforce@berkeley.edu](mailto:airforce@berkeley.edu)

### Naval ROTC

Department of Naval Science  
152 Hearst Gymnasium, UC Berkeley

Berkeley, CA 94270-3640

(510) 642-3551; <http://navyrotc.berkeley.edu>

UC Davis students may participate in the Navy and Marine Corps ROTC program at UC Berkeley. The program is 4 years long and includes courses and weekly professional development laboratories (drill) at UC Berkeley. Students normally compete for national scholarships as high school seniors, although interested students may enroll as freshmen or sophomores and compete for scholarships based on successful participation in the program. A student who satisfactorily completes an ROTC program and is awarded a degree from UC Davis receives an active duty commission as a Second Lieutenant in the U.S. Marine Corps or an Ensign in the U.S. Navy.

Navy option students take the following courses:

Freshman year:

- |      |                                |
|------|--------------------------------|
| NS 1 | Introduction to Naval Science  |
| NS 2 | Sea Power and Maritime Affairs |

Sophomore year:

- |       |                           |
|-------|---------------------------|
| NS 3  | Leadership and Management |
| NS 10 | Naval Ship Systems I      |

Junior year:

- |        |                                    |
|--------|------------------------------------|
| NS 12A | Navigation and Naval Operations I  |
| NS 12B | Navigation and Naval Operations II |

Senior year:

- |        |                       |
|--------|-----------------------|
| NS 401 | Naval Ship Systems II |
| NS 412 | Leadership and Ethics |

In lieu of NS401, NS10, NS12A and NS12B, Marine Corps students participate in Marine Seminars and complete MA154, History of Littoral Warfare and MA20, Evolution of Warfare (or a designated equivalent).

Scholarship students are required to complete a number of other courses at Davis, including one year each of calculus, physics, and English, and one quarter each of computer science, and military history or national security policy.

Interested students should contact the Department of Naval Science at UC Berkeley at the address above to obtain information and apply.

### Courses in Military Science (MSC)

#### Lower Division

##### 11. U.S. Army Leadership and Personal Development (1)

Lecture—1 hour. Prerequisite: lower division standing. United States Army, its organization, customs, courtesies, and rank structure. Course surveys personal development skills needed for effective leadership such as critical thinking, time management, and health and fitness. Familiarization with the Army ROTC program.—F. (F.)

##### 12. Introduction to Tactical Military Leadership (1)

Lecture—1 hour. Prerequisite: lower division standing. Military leadership fundamentals to include setting direction, problem-solving, presenting briefs, and using effective writing skills. Basic military tactics, orienteering and land navigation. Dimensions of leadership values, attributes, skills, and actions.—W. (W.)

##### 13. Introduction to Basic Military Operations (1)

Lecture—1 hour. Prerequisite: lower division standing. Basic military tactical theories and their application at the individual and squad level. Military tactical operations and basic military first aid.—S. (S.)

##### 14A. Introduction to Military Leadership Skills (0.5)

Laboratory—2 hours. Prerequisite: lower division standing and consent of instructor. Personal and organizational leadership skills introduced in leadership laboratory. Extensive supervised leadership experiences conducted in a military environment. Basic military skills necessary to function in a leadership role. (P/NP grading only.)—F. (F.)

**14B. Introduction to Military Leadership Skills (0.5)**

Laboratory—2 hours. Prerequisite: lower division standing; consent of instructor. Continuation of development of leadership and military skills introduced in course 14A. Emphasis on the role of the individual, the basic organizational element of the Army, the squad. Supervisory controls reduced as students gain capabilities. (P/NP grading only.)—W. (W.)

**14C. Introduction to Military Leadership Skills (0.5)**

Laboratory—2 hours. Prerequisite: lower division standing; consent of instructor. Development of skills required for promotion to junior non-commissioned officer level. Chain of command from company through individual levels. Interrelationship of squad and platoon organization. (P/NP grading only.)—S. (S.)

**21. Military History, Study of Battles (2)**

Lecture—2 hours. Prerequisite: course 22B or consent of instructor. Application of the nine Principles of War to key battles in American and World history. Tactics on a strategic and operational level. Evaluation of leadership and decision-making processes of key leaders. Offered irregularly.—S. (S.)

**22A. Innovative Team Leadership (2)**

Lecture—2 hours. Prerequisite: lower division standing or consent of instructor. Leadership values, attributes and theories. Use of basic military skills such as land navigation and squad operations to enhance understanding of the Army. Types of military briefings. Practice in interpersonal skills. Presentation of a briefing.—F. (F.)

**22B. Foundations of Tactical Leadership (2)**

Lecture—2 hours. Prerequisite: course 22A or consent of instructor. Leadership of tactical teams in complex operating environment. Self-assessment of leadership style. Basic military skills: terrain analysis, patrolling and operations orders. Dynamics of adaptive leadership in the context of military operations.—W. (W.)

**24A. Individual Military Leadership Skills (0.5)**

Laboratory—2 hours. Prerequisite: courses 14A, B and C, enrolled in course 22A or consent of instructor. Develop and practice personal military leadership skills in extensive supervised leadership labs. Cadets perform basic military skills, improve on troop leading procedures and lead subordinates in tactical situations. Begin with drill and ceremony, land navigation and individual movement techniques. (P/NP grading only.)—F. (F.)

**24B. Individual Military Leadership Skills (0.5)**

Laboratory—2 hours. Prerequisite: courses 14A, B and C, enrolled in course 22B or consent of instructor. Development and practice of personal military leadership skills in extensive supervised leadership labs. Performance of basic military skills, improvement on troop-leading procedures, leadership of subordinates in tactical situations. (P/NP grading only.)—W. (W.)

**24C. Individual Military Leadership Skills (0.5)**

Laboratory—2 hours. Prerequisite: courses 14A, B and C, enrolled in course 21 or consent of instructor. Develop and practice personal military leadership skills in extensive supervised leadership labs. Begin with drill and ceremony, land navigation and individual movement techniques. Cadets perform basic military skills, improve on troop leading procedures and lead subordinates in tactical situations. (P/NP grading only.)—S. (S.)

**Upper Division****131. Military Leadership and Management (2)**

Lecture—2 hours. Prerequisite: upper division standing and consent of instructor. Leadership and management in organizational context. Team dynamics, leadership styles, professional ethics, development of a leadership framework. Management skills for

planning, decision making, and organizing developed through definition of problems, development of courses of action, implementation of solutions.—F. (F.)

**132A. Advanced Military Operations (2)**

Lecture—2 hours. Prerequisite: upper division standing, course 131 or consent of instructor. Military small unit tactical theory as the basis for leadership development. Principles of war, contemporary operating environment, Geneva Law of Land Warfare, military offensive and defensive operations. Emphasis on development of critical thinking, problem solving, and communication skills.—W. (W.)

**132B. Applied Leadership (2)**

Lecture—2 hours. Prerequisite: upper division standing, course 132A or consent of instructor. Military small unit tactical theory and application as basis for leadership development. Application of leadership styles and skills to complete problem-solving exercises and the development of an adaptable framework applicable to a variety of shifting environments and situations.—S. (S.)

**134A. Adaptive Tactical Leadership (0.5)**

Laboratory—2 hours. Prerequisite: upper division standing, course 131 or consent of instructor. Small unit tactical operations serve as the basis for enhancement of leadership performance through tactical application. Assessment of leadership attributes, skills, and actions through participation in a variety of leadership roles in problem-solving exercises. (P/NP grading only.)—F. (F.)

**134B. Adaptive Tactical Leadership (0.5)**

Laboratory—2 hours. Prerequisite: upper division standing, course 132A or consent of instructor. Small unit tactical operations as the basis for enhancement of leadership performance through tactical application. Assessment of leadership attributes, skills, and actions through participation in a variety of leadership roles in problem-solving exercises. (P/NP grading only.)—W. (W.)

**134C. Adaptive Tactical Leadership (0.5)**

Laboratory—2 hours. Prerequisite: upper division standing, course 132B or consent of instructor. Small unit tactical operations are taught, serve as basis for students exploration, development. Serve in variety of leadership roles in which leadership attributes, skills, actions are closely assessed and developed while they are faced with series of problem solving exercises. (P/NP grading only.)—S. (S.)

**141. Ethical Leadership (2)**

Lecture—2 hours. Prerequisite: upper division standing; consent of instructor. Direct influence of leaders on individual motivation and group processes. The complexities of balancing moral, legal, and ethical obligations while applying fundamental business principles in determining the best possible outcome from competing solutions.—F. (F.)

**142. Military Law (2)**

Lecture—2 hours. Prerequisite: division standing and course 141, or consent of instructor. The United States Constitution and the Military Justice System. Basic law of war, with an emphasis on issues that might arise on the battlefield or during a national emergency.—W. (W.)

**143. U.S. Army Management Systems (2)**

Lecture—2 hours. Prerequisite: upper division standing and course 142 or consent of instructor. Leadership and management, focusing on four management systems: planning, organizing, leading and controlling. Practical methodologies for assessing management decisions while balancing competing ethical, economic, infrastructure and future growth trade-offs.—S. (S.)

**144A. Military Training Leadership Skills (0.5)**

Laboratory—2 hours. Prerequisite: upper division standing, course 141 or consent of instructor. Enhancement of student leadership performance through practical application. Small unit military tactical operations as the basis for the student exploration and development. (P/NP grading only.)—F. (F.)

**144B. Military Training Leadership Skills (0.5)**

Laboratory—2 hours. Prerequisite: upper division standing, course 142 or consent of instructor. Enhancement of student leadership performance through practical application. Small unit military tactical operations serve as the basis for student exploration and development. (P/NP grading only.)—W. (W.)

**144C. Military Training Leadership Skills (0.5)**

Laboratory—2 hours. Prerequisite: upper division standing, course 143 or consent of instructor. Enhancement of student leadership performance through practical application. Small unit military tactical operations as the basis for student exploration and development. (P/NP grading only.)—S. (S.)

**191. Special Studies in Military Science (2)**

Independent study—6 hours. Prerequisite: consent of department chair, and courses 131, 132A, 132B, 141, 142, 143. Intensive examination of one or more special problems in military science. Possible areas of study include leadership dimensions, principles of war, air-land battle imperatives, military strategy, the operational art and professional ethics. May be repeated two times for credit when topic differs. (P/NP grading only.) Offered irregularly.

## Molecular Biosciences

See **Veterinary Medicine, School of, on page 581.**

## Molecular and Cellular Biology

(College of Biological Sciences)

Jodi Nunnari, Ph.D., Professor, Chairperson of the Department

**Department Office.** 149 Briggs Hall  
530-752-3611; <http://www.mcb.ucdavis.edu>

**Faculty****Primary Members**

Jawdat Al-Bassam, Ph.D., Assistant Professor

John Albeck, Ph.D., Assistant Professor

Enoch Baldwin, Ph.D., Associate Professor

Sean M. Burgess, Ph.D., Professor

Kenneth C. Burtis, Ph.D., Professor

Judy Callis, Ph.D., Professor and Vice Chair

Frederic L. Chedin, Ph.D., Professor

R. Holland Cheng, Ph.D., Professor

Bruce W. Draper, Ph.D., Associate Professor

JoAnne Engebrecht, Ph.D., Professor and Vice Chair

Oliver Fiehn, Ph.D., Professor

Andrew Fisher, Ph.D., Professor (*Chemistry*)

Christopher S. Fraser, Ph.D., Associate Professor

Charles S. Gasser, Ph.D., Professor

Celina Juliano, Ph.D., Professor

Kenneth B. Kaplan, Ph.D., Professor

Ian Korff, Ph.D., Professor

J. Clark Lagarias, Ph.D., Professor

Walter Leal, Ph.D., Professor

Richard James McKenney Ph.D., Professor

Francis J. McNally, Ph.D., Professor

Richard W. Michelmore, Ph.D., Professor

(Vegetable Crops; Medical Microbiology and Immunology)

Jeanette E. Natzle, Ph.D., Associate Professor

Jodi Nunnari, Ph.D., Professor Chairperson of the Department

Kassandra Ori McKenney, Ph.D., Professor

Ted Powers, Ph.D., Professor

Gerald T. Quon, Ph.D., Assistant Professor

Raymond L. Rodriguez, Ph.D., Professor

Lesilee S. Rose, Ph.D., Professor

Jonathan M. Scholey, Ph.D., Professor

Daniel A. Starr, Ph.D., Professor

David K. Wilson, Ph.D., Professor

### Secondary Section Members

John J. Harada, Ph.D., Professor  
*Academic Senate Distinguished Teaching Award*  
 Wolf-Dietrich Heyer, Ph.D., Professor  
 James Hildreth, Ph.D., Professor  
 Stephen C. Kowalczykowski, Ph.D., Distinguished Professor  
 William J. Lucas, Ph.D., Professor  
 Brian Mullooney, Ph.D., Professor  
 Sharman O'Neill, Ph.D., Professor  
 Martin L. Privalsky, Ph.D., Professor  
 Steven M. Theg, Ph.D., Professor  
 Larry N. Vanderhoef, Ph.D., Professor  
 Martin Wilson, Ph.D., Professor

### Emeriti Faculty

Peter B. Armstrong, Ph.D., Professor Emeritus  
 Sterling Chaykin, Ph.D., Professor Emeritus  
 James S. Clegg, Ph.D., Professor Emeritus  
 Eric E. Conn, Ph.D., Professor Emeritus *Academic Senate Distinguished Teaching Award, UC Davis Prize for Teaching and Scholarly Achievement*  
 Richard S. Criddle, Ph.D., Professor Emeritus  
 John H. Crowe, Ph.D., Professor Emeritus  
 Michael E. Dahmus, Ph.D., Distinguished Professor Emeritus  
 David W. Deamer, Ph.D., Professor Emeritus  
 Roy H. Doi, Ph.D., Distinguished Professor Emeritus  
*Academic Senate Distinguished Teaching Award*  
 Gordon J. Edlin, Ph.D., Professor Emeritus  
 Carol A. Erickson, Ph.D., Distinguished Professor Emeritus  
 Marilyn E. Etzler, Ph.D., Professor Emeritus  
 Richard H. Falk, Ph.D., Professor Emeritus  
 Leslie D. Gottlieb, Ph.D., Professor Emeritus  
 Melvin M. Green, Ph.D., Professor Emeritus  
 Robert D. Grey, Ph.D., Professor Emeritus  
*Academic Senate Distinguished Teaching Award*  
 Jerry L. Hedrick, Ph.D., Professor Emeritus  
*Distinguished Graduate Mentoring Award*  
 John A. Kiger, Ph.D., Professor Emeritus  
 Julie A. Leary, Ph.D., Professor Emeritus  
 Mark G. McNamee, Ph.D., Professor Emeritus  
 Diana G. Myles, Ph.D., Professor Emeritus  
 Carl W. Schmid, Ph.D., Professor Emeritus  
 Irwin H. Segel, Ph.D., Distinguished Professor Emeritus  
 Che-Kun J. Shen, Ph.D., Professor Emeritus  
 Larry R. Sprechman, Ph.D., Senior Lecturer Emeritus

### Lecturers

Silvia Carrasco Garcia, Ph.D., Lecturer, SOE  
 Marina Elefson Crowder, Ph.D., Lecturer, SOE  
 Kenneth L. Hilt, Ph.D., Lecturer  
 Mona M. Monfared, Ph.D., Lecturer, SOE  
 Larry Z. Morand, Ph.D., Academic Coordinator/Lecturer  
 Mark F. Sanders, Ph.D., Lecturer Emeritus  
 Molecular and Cellular Biology offers three major programs: Biochemistry and Molecular Biology, Cell Biology, and Genetics and Genomics.

### The Biochemistry and Molecular Biology Major Program

The Biochemistry and Molecular Biology major introduces students to the chemistry of living organisms and the experimental techniques that are used to probe the structures and functions of biologically important molecules. Students who enjoy both chemistry and biology and who are comfortable with quantitative approaches to problem solving will find this major a rewarding field of study.

**The Program.** The biochemistry and molecular biology program begins with the four-course, upper division common curriculum that provides an introduction to the principles of biochemistry, genetics, and cell biology. Majors then take a comprehensive and rigorous laboratory course to familiarize them with the most important aspects of biochemical research. Additional upper division courses in biochemistry and molecular biology examine detailed aspects of these subjects. Students are also required

to take courses in other biological sciences and a full year of physical chemistry.

**Career Alternatives.** The biochemistry and molecular biology program provides a solid scientific background for students seeking a research, teaching, or service career in the life sciences. Positions are open to biochemists in bio-medical, biotechnological, pharmaceutical, agricultural research and chemical industries. Also, university-affiliated research laboratories, hospital laboratories, and government-sponsored research facilities provide employment opportunities. The major provides excellent preparation for advanced study in graduate or professional schools.

### B.S. Major Requirements:

UNITS

#### Preparatory Subject Matter ..... 50-57

Biological Sciences 2A-2B-2C ..... 15  
 Chemistry 2A-2B-2C or 2AH-2BH-2CH ..... 15  
 Mathematics 17A-17B-17C or 21A-21B (21C recommended) ..... 8-12  
 Physics 7A-7B-7C ..... 12  
 Chemistry 8A-8B or 118A-118B-118C ..... 6-12

#### Depth Subject Matter ..... 44-49

Biological Sciences 101, 102, 103, 104 ..... 13  
 Statistics 100 or 130A-130B ..... 4-8  
 Molecular and Cellular Biology 140L ..... 5  
 Two courses from: Molecular and Cellular Biology 143, 144, or 145 ..... 6  
 Molecular and Cellular Biology 121 ..... 3  
 Molecular and Cellular Biology 150; or 163 ..... 3-4  
 Select at least 10 additional units from the following:

Chemistry 107A, 107B  
 Evolution and Ecology 100, 150  
 Microbiology 101, 102, 103L, 150, 170  
 Molecular and Cellular Biology 120L, 123, 124, 126, 138, 139, 143, 144, 145, 148, 150, 158, 160L, 162, 163, 164, 178, 182, 191  
 Neurobiology, Physiology, and Behavior 100, 101, 103, 112, 160, 161  
 Pathology, Microbiology, and Immunology 126, 126L, 128  
 Plant Biology 111, 111D, 113, 113D, 152  
 Medical Microbiology 188  
 No more than four units of research (193, 194H, 199) may be used for credit in this category

#### Total Units for the Major ..... 100-115

**Master Adviser.** F.J. McNally

**Advising.** Biology Academic Success Center (BASC); 1023 Sciences Laboratory Building; 530-752-0410; <http://basc.ucdavis.edu/>.

### The Genetics and Genomics Major Program

The Genetics and Genomics major provides a broad background in the biological, mathematical, and physical sciences basic to the study of heredity, gene expression and evolution. The major is sufficiently flexible to accommodate students interested in the subject either as a basic discipline in the biological sciences or in terms of its applied aspects such as biotechnology, medicine, and agriculture.

**The Program.** The genetics and genomics program begins with the four-course, upper division core curriculum that provides an introduction to the principles of genetics, biochemistry, and cell biology. Students then take additional upper division courses in specialized areas of modern genetics including gene expression, evolution, development, human genetics and genomics, as well as a laboratory courses in the principles of genetics and genomics. Additional upper division courses in biological sciences, as well as internship/research coursework can be chosen to fulfill required elective units.

**Career Alternatives.** The genetics and genomics degree provides suitable preparation for a wide variety of careers, including teaching, research, work with biotechnology companies, medicine, and all the health sciences. It is also an excellent background for students wishing to continue their education in a graduate program, a teacher-training program, medical school, veterinary school, or other professional schools.

### B.S. Major Requirements:

UNITS

#### Preparatory Subject Matter ..... 56-66

Biological Sciences 2A-2B-2C ..... 15  
 Chemistry 2A-2B-2C or 2AH-2BH-2CH ..... 15  
 Chemistry 8A-8B or 118A-118B-118C ..... 6-12  
 Mathematics 17A-17B-17C or 21A-21B (21C recommended) ..... 8-12  
 Physics 7A-7B-7C ..... 12

### B.S. Major Requirements:

UNITS

#### Preparatory Subject Matter ..... 56-66

Biological Sciences 2A-2B-2C ..... 15

**Depth Subject Matter ..... 40-48**

- Biological Sciences 101, 102 + 103 (or 105), 104 ..... 10-13  
 Molecular and Cellular Biology 121, 182 ..... 6  
 Evolution and Ecology 100 or Biological Sciences 181 ..... 3-4  
 Molecular and Cellular Biology 164 or Biological Sciences 183 ..... 3  
 Molecular and Cellular Biology 160L or Biological Sciences 180L ..... 5  
 Statistics 100 or 130A-130B ..... 4-8  
 Restricted Electives ..... 9  
 Select at least nine additional units from the following:  
   Biological Sciences 134, 181, 183  
   Biotechnology 150  
   Engineering: Computer Science 124  
   Evolution and Ecology 100, 102, 103, 131, 150, 175  
   Microbiology 105, 150, 170  
   Molecular and Cellular Biology 150, 162, 163, 164  
   Plant Biology 112, 113  
   Plant Science 154  
 Or upper division courses in genetics or other fields relevant to the student's interest chosen in consultation with the adviser. No more than 4 units of 192, 193, 194H, 198, or 199 may be used for credit in this category.

**Total Units for the Major ..... 96-114****Master Adviser.** J.E. Natzle

**Advising.** Biology Academic Success Center (BASC); 1023 Sciences Laboratory Building; 530-752-0410; <http://basc.ucdavis.edu/>.

**Graduate Study.** See Integrative Genetics and Genomics [A Graduate Group], on page 380.

**Courses in Molecular and Cellular Biology (MCB)****Lower Division****10. Introduction to Human Heredity (4)**

Lecture—3 hours; discussion—1 hour. Topics in human heredity and human gene structure and function, including the genetic basis of human development, causes of birth defects, mental retardation, genetic diseases, sexual determination, development, and behavior. GE credit: SciEng | QL, SE, SL.—F, W, S. (F, W, S.) Engebrecht, Rannala

**99. Special Study (1-5)**

Independent study—3-15 hours. Prerequisite: consent of instructor. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

**Upper Division****110Y. iBioseminars in Cell and Molecular Biology (3)**

Web Virtual Lecture—1.5 hours; web electronic discussion—1.5 hours; lecture/discussion—2 hours. Prerequisite: Biological Sciences 101, 102 and 103 (or 105) and 104. Hybrid course in Cell and Molecular Biology for senior level (1) Biochemistry/Molecular Biology; (2) Genetics; or (3) Cell Biology majors. Face-to-face instruction combined with online lectures available at iBioseminars website delivered by leading researchers in Cell and Molecular Biology. Students who have previously taken MCB 110V cannot receive credit for MCB 110Y. GE credit: SciEng | SE, SL.—S. (S.) Scholey

**120L. Molecular Biology and Biochemistry Laboratory (6)**

Laboratory—10 hours; lecture—2 hours; laboratory/discussion—1 hour. Prerequisite: Biological Sciences 102 or consent of instructor. Restricted enrollment. Introduction to laboratory methods and procedures employed in studying molecular biology and biochemical processes. Designed for students who need experience in the use of molecular biology and biochemical techniques as research and

analytical tools. GE credit: SciEng | QL, SE, SL, VL, WE.—F, W, S. (F, W, S.) Dinesh-Kumar, Hilt, Lagarias, Liu, Morand, Theg, Wilson

**121. Advanced Molecular Biology (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 101 and one course from among Biological Sciences 102, 105, or Animal Biology 102 (Biological Sciences 102, 105 or Animal Biology 102 may be taken concurrently although prior completion is recommended). Structure, expression, and regulation of eukaryotic genes. Chromosome structure and replication; gene structure, transcription, and RNA processing; protein synthesis and translation control; development, immune system, and oncogenes. Not open for credit to students who have completed course 161. GE credit: SciEng | QL, SE, SL.—F, W, S. (F, W, S.) Burgess, Gasser, Harmer, Natzle, Powers

**123. Behavior and Analysis of Enzyme and Receptor Systems (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 103. Introduction to the principles of enzyme kinetics and receptor-ligand interactions with emphasis on metabolic regulation and data analysis. Topics include simultaneous equilibria, chemical and steady-state kinetics, allosteric enzymes, multireactant systems, enzyme assays, membrane transport and computer-assisted simulations and analyses. GE credit: SciEng | QL, SE.—F, S. (F, S.) Fraser, Wilson

**124. Macromolecular Structure and Function (4)**

Lecture—4 hours. Prerequisite: Biological Sciences 103, Chemistry 118C. An in-depth investigation into protein and nucleic acid structure and thermodynamics and how these properties influence their biological functions. Key examples of important functional classes of these molecules will be examined. Not open for credit to students who have completed course 122 or Chemistry 108. GE credit: SciEng | SE.—F, (F, W) Baldwin

**126. Plant Biochemistry (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 103 or 105. The biochemistry of important plant processes and metabolic pathways. Discussion of methods used to understand plant processes, including use of transgenic plants. (Same course as Plant Biology 126.) GE credit: SciEng | SE, SL.—W. (W.) Callis, Tian

**138. Undergraduate Seminar in Biochemistry (1)**

Seminar—1 hour. Prerequisite: Biological Sciences 103. Discussion of the historical developments of modern biochemistry or current major research problems. May be repeated two times for credit when topic differs. (P/NP grading only.) GE credit: OL, SE.—F, W, S. (F, W, S.) Callis, Carrasco, Gasser, Nunnari

**139. Undergraduate Seminar in Biochemistry (2)**

Seminar—2 hours. Prerequisite: Biological Sciences 103. Discussion of the historical developments of modern biochemistry or current major research problems. May be repeated two times for credit when topic differs. (P/NP grading only.) GE credit: SciEng | OL, SE.—F, W, S. (F, W, S.) Callis, Gasser, Nunnari

**140L. Cell Biology Laboratory (5)**

Lecture—2 hours; laboratory—6 hours; discussion—1 hour. Prerequisite: Biological Sciences 104 (may be taken concurrently). Exercises illustrating the principles of cell biology with emphasis on light microscopy. GE credit: SciEng | OL, QL, SE, SL, VL.—W. (W.) Kaplan, Morand, Nunnari

**142. Advanced Cell Biology: Contractile and Motile Systems (4)**

Lecture—3 hours; term paper. Prerequisite: Biological Sciences 102, 104 (may be taken concurrently); Mathematics 16B. Advanced cell biology with emphasis on molecular, biophysical and cellular properties of contractile and motile systems. Offered irregularly. GE credit: SciEng | SE.—S. (S.)

**143. Cell and Molecular Biophysics (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 101, 102, 103, 104. Physical chemical principles by which molecules form living, moving, reproducing cells. Physical nature of cytoplasm; molecular structure/bonding in macromolecules, macromolecular assemblies and protein machines. Physical techniques and modeling of cytoskeletal polymer-motor dynamics and function during intracellular transport, mitosis and motility. GE credit: SciEng | QL, SE.—S. (F, S.) Al-Bassam

**144. Mechanisms of Cell Division (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 101, 102, 104. The molecules and mechanisms that allow eukaryotic cells to coordinate cell growth, DNA replication, segregation of chromosomes and cell division. GE credit: SciEng | SE, WE.—F. (F.) McNally

**145. Assembly and Function of Cell Signaling Machinery (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 101, 102, 104. Molecular basis of cell signaling, including positioning of cellular machinery, components of various signaling pathways, and downstream effects of signaling on cell adhesion, cell differentiation, and programmed cell death. GE credit: SciEng | SE.—S. (S.) Albeck, Erickson

**148. Undergraduate Seminar in Cell Biology (2)**

Seminar—2 hours. Prerequisite: upper division standing in the biological sciences or a related discipline. Student reports on current topics in cell biology with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and reports of undergraduate research may be included. May be repeated for credit. (P/NP grading only.) Offered irregularly. GE credit: OL, SE.—F, W, S. (F, W, S.)

**150. Developmental Biology (4)**

Lecture—4 hours. Prerequisite: Biological Sciences 101. Analysis of the mechanistic basis for animal development with a focus on experimental evidence and the relevant fundamental experimental strategies. Fertilization and early development, morphogenesis and patterning, cell differentiation, regulation of cell proliferation and tissue growth. GE credit: SciEng | SE, SL.—W. (W.) Draper, Natzle

**158. Undergraduate Seminar in Developmental Biology (2)**

Seminar—2 hours. Prerequisite: upper division standing in the biological sciences or a related discipline. Student reports on current topics in cell biology with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and reports of undergraduate research may be included. May be repeated for credit. (P/NP grading only.) GE credit: OL, SE.—F, W, S. (F, W, S.)

**160L. Principles of Genetics Laboratory (5)**

Laboratory—6 hours; lecture—2 hours, discussion/laboratory—1 hour. Prerequisite: Biological Sciences 101. Laboratory work in basic and molecular genetics including gene mapping, isolation and characterization of mutants in eukaryotic model systems, reverse genetics, gel electrophoresis, recombinant DNA techniques, and PCR. Not open for credit to students who have completed Genetics 100L. GE credit: SciEng | QL, SE, VL, WE.—F, W, S. (F, W, S.) Ellefson-Crowder, Engebrecht, Harmer, Natzle, Rose, Sundaresan

**162. Human Genetics and Genomics (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 101. The human genome and genetic variation in human populations, molecular and genomic approaches in the practice of human genetics, epigenetic gene regulation, personal genetics and genomic medicine. GE credit: SciEng | QL, SE, SL.—F. (F.) Chedin

**163. Developmental Genetics (3)**

Lecture—3 hours. Prerequisite: course 121. Current aspects of developmental genetics. Historical background and current genetic approaches to the study of development of higher animals. GE credit: SciEng | SE.—W. (W.) Natzle, Rose

**164. Advanced Eukaryotic Genetics (3)**

Lecture—3 hours. Prerequisite: course 121. Five basic operations of genetic analysis: mutation, segregation, recombination, complementation, and regulation. Emphasis on the theory and practice of isolating and analyzing mutations, as well as understanding mechanisms underlying both Mendelian and epigenetic inheritance. GE credit: SciEng | SE, SL.—S. (S.) Burgess, Engebret

**178. Undergraduate Seminar in Molecular Genetics (1)**

Seminar—1 hour. Prerequisite: upper division standing, completion of Biological Sciences 101, and completion or concurrent enrollment in course 121. Discussion of current topics in molecular genetics to show advanced applications of basic principles and to highlight professional career opportunities. May be repeated one time for credit when topic differs. (P/NP grading only.) GE credit: SciEng | OL, SE.—F, W, S. (F, W, S.) Chedin, Natzle, Rodriguez

**182. Principles of Genomics (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 101. Fundamentals of genomics, including structural genomics, functional genomics, proteomics, and bioinformatics, focusing on the impact of these disciplines on research in the biological sciences. Social impacts of genomic research. GE credit: SciEng | SE.—W. (W.) Burts, Korf

**190C. Undergraduate Research Conference (1)**

Discussion—1 hour. Prerequisite: upper division standing and consent of instructor; concurrent enrollment in course 193 or 199. Presentation and discussion of current research by faculty and students. May be repeated for credit. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

**191. Introduction to Research (1)**

Seminar—1 hour. Prerequisite: Biological Sciences 102 (may be taken concurrently) or consent of instructor. Various topics in molecular and cellular biology including biochemistry, genetics, and cell biology will be discussed, along with ways undergraduates can participate in research projects of faculty members. May be repeated for credit. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

**192. Internship (1-12)**

Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Technical and/or practical experience on and off campus, supervised by a member of the Section of Molecular and Cellular Biology faculty. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

**193. Advanced Research (3)**

Laboratory—6 hours; discussion—1 hour. Prerequisite: upper division standing, completion of an upper division Molecular and Cellular Biology laboratory course and consent of instructor. Research project carried out under the supervision of a faculty sponsor. Discussion and analysis of results and proposed experiments on a weekly basis with faculty sponsor. May include presentation of a seminar to a research group. May be repeated for credit. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

**194. Thesis Research (3)**

Independent study—9 hours. Prerequisite: 6 units of course 193 and/or 199 with faculty director; senior standing. Continuation of an intensive, individual laboratory research project in biochemistry, genetics, or cell biology culminating with the presentation of the work in a written thesis and in a seminar. (P/NP grading only.) GE credit: SciEng | OL, SE, WE.—F, W, S. (F, W, S.) Wheeler

**194H. Research Honors (3)**

Independent study—9 hours. Prerequisite: 6 units of course 193 and/or 199 with faculty director; senior standing; GPA of at least 3.250; consent of Section.

Honors project. Continuation of an intensive, individual laboratory research project in biochemistry, genetics, or cell biology culminating with the presentation of the work in a written thesis and in a seminar. (P/NP grading only.) GE credit: OL, SE, WE.—F, W, S. (F, W, S.)

**197T. Tutoring in Molecular and Cellular Biology (1-5)**

Tutorial—2-6 hours. Prerequisite: upper division standing, completion of course to be tutored, and consent of instructor. Assisting the instructor in one of the section's regular courses by tutoring individual or small groups of students in a laboratory, in voluntary discussion groups, or other voluntary course activities. May be repeated for credit. (P/NP grading only.) Offered irregularly. GE credit: SE.—F, W, S. (F, W, S.)

**198. Directed Group Study (1-5)**

Variable—1-5 hours. Prerequisite: consent of instructor. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

**199. Special Study for Advanced Undergraduates (1-5)**

Independent study—3-15 hours. Prerequisite: consent of instructor. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

**Graduate****248. Seminar in Cell Biology (2)**

Seminar—2 hours. Prerequisite: consent of instructor. Discussion of recent literature on the physical and chemical aspects of organization and function of living systems, topics of current interest in ultrastructure and function of cells. Organizational and functional properties of the molecular and cellular levels of biological systems. May be repeated for credit.

**256. Cell and Molecular Biology of Cancer (2)**

Lecture—1 hour; term paper. Prerequisite: course in cell or developmental biology (e.g., course 150, 141, 163, or Biological Sciences 104). Analysis at the cellular and molecular levels of the regulation of normal and neoplastic tissue growth; tumor dissemination; identification and characterization of oncogenic agents; characterization of oncogenes and tumor-suppressor genes. —F. (F.)

**258. Seminar in Development (2)**

Seminar—2 hours. Prerequisite: consent of instructor. Reports and discussion on embryology, morphogenesis, and developmental mechanisms. May be repeated for credit. —W. (W.)

**259. Literature in Developmental Biology (1)**

Seminar—1 hour. Prerequisite: consent of instructor. Critical presentation and analysis of recent journal articles in developmental biology. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.) Draper

**263. Biotechnology Fundamentals and Application (2)**

Lecture—2 hours. Prerequisite: Biological Sciences 101, 102 and Microbiology 102 or consent of instructor. Must be a graduate student in good standing. Fundamentals of molecular biology and chemical engineering involved in recombinant DNA technology. Topics: principles of rate processes of biological systems, optimization of bioreactors, and issues related to overexpression and production of recombinant molecules. Participation in student-directed team projects. —W. (W.) McDonald, Privalsky, Rodriguez, VanderGheynst

**282. Biotechnology Internship (7-12)**

Internship—21-36 hours. Prerequisite: graduate standing and consent of instructor. Open only to students participating in the Designated Emphasis in Biotechnology program. Research at a biotechnology company or interdisciplinary cross-college lab for a minimum of 3 months as part of the Designated Emphasis in Biotechnology Program. (S/U grading only.)—F, W, S. (F, W, S.) Dandekar

**290C. Research Conference (1)**

Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Presentations and critical discussions of faculty and graduate student research in molecular and cellular biology including biochemistry, genetics, and cell biology. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**291. Current Progress in Molecular and Cellular Biology (1)**

Seminar—1 hour. Prerequisite: graduate standing or consent of instructor. Seminars presented by guest lecturers on subject of their own research activities. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**294. Current Progress in Biotechnology (1)**

Seminar—1 hour. Prerequisite: graduate standing or consent of instructor. Seminars presented by guest lecturers on subjects of their own research activities. May be repeated for credit. (Same course as Chemical Engineering 294.) (S/U grading only.)—F, W, S. (F, W, S.) Kjelstrom, McDonald, Rodriguez

**295. Literature in Molecular and Cellular Biology (1)**

Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Critical reading and evaluation of current literature in molecular and cellular biology disciplines. Papers will be presented and discussed in detail. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.) Baldwin, Fisher, Privalsky, Wilson

**298. Group Study (1-5)**

Variable—1-5 hours. Prerequisite: consent of instructor. (S/U grading only.)—F, W, S. (F, W, S.)

**299. Research (1-12)**

Independent study—3-36 hours. (S/U grading only.)—F, W, S. (F, W, S.)

**Professional****390. Methods of Teaching (1)**

Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Practical experience in the methods and problems of teaching biochemistry/genetics/cell biology. Includes analysis of texts and supporting material, discussion of teaching techniques, preparing for and conducting discussion and laboratory sections, formulating examinations under supervision of instructor. Participating in the teaching program required for Ph.D. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**Molecular, Cellular, and Integrative Physiology (A Graduate Group)**

Catherine VandeVoort, Ph.D., Chairperson of the Group

**Group Office.** 227 Life Sciences Building  
530-752-9092; <http://mcip.ucdavis.edu>

**Faculty**

Paul Allen, Ph.D., Professor (*Molecular Biosciences*)  
Keith Baar, Ph.D., Associate Professor

(*Neurobiology, Physiology, and Behavior*)

Linda Barter, Ph.D., Associate Professor

(*VM: Surgical and Radiological Sciences*)

Donald M. Bers, Ph.D., Professor

(*Medical Pharmacology*)

Sue Bodine, Ph.D., Professor

(*Neurobiology, Physiology, and Behavior*)

Laura Borodinsky, Ph.D., Assistant Professor

(*Physiology & Membrane Biology*)

Julie Bossuyt, Ph.D., Associate Professor

(*Medical Pharmacology*)

Robert Brosnan, Ph.D., Professor

(*VM: Surgical & Radiological Sciences*)

C. Titus Brown, Ph.D., Associate Professor

(*Genome Center*)

Rebecca Calisi Rodriguez, Ph.D., Assistant Professor  
*(Neurobiology, Physiology, and Behavior)*  
 Christopher C. Calvert, Ph.D., Professor  
*(Animal Science)*  
 Earl E. Carstens, Ph.D., Professor  
*(Neurobiology, Physiology, and Behavior)*  
 Luis Carvajal-Carmona, Ph.D., Assistant Professor  
*(Biochemistry and Molecular Medicine)*  
 Gretchen Casazza, Ph.D., Research Director  
*(UCD Sports Medicine)*  
 Chao-Yin Chen, Ph.D., Associate Professor  
*(Medical Pharmacology)*  
 Tsung-Yu Chen, Ph.D., Professor  
*(Med: Neurology)*  
 Gary N. Cherr, Ph.D., Professor  
*(Bodega Marine Laboratory)*  
 Nipavan Chiamvimonvat, M.D., Professor  
*(Cardiovascular Medicine)*  
 Alan J. Conley, D.V.M, Ph.D., Professor  
*(Population Health and Reproduction)*  
 Gino Cortopassi, Ph.D., Professor  
*(Molecular Biosciences)*  
 Carroll E. Cross, M.D., Professor  
*(Internal Medicine, Human Physiology)*  
 Fitz-Roy E. Curry, Ph.D., Professor  
*(Physiology and Membrane Biology)*  
 Wenbin Deng, Ph.D., Associate Professor  
*(Biochemistry and Molecular Medicine)*  
 Michael J. Ferns, Ph.D., Professor  
*(Anesthesiology and Pain Medicine)*  
 Alla F. Fomina, Ph.D., Assistant Professor  
*(Physiology and Membrane Biology)*  
 Charles A. Fuller, Ph.D., Professor  
*(Neurobiology, Physiology, and Behavior)*  
 J. David Furlow, Ph.D., Professor  
*(Neurobiology, Physiology, and Behavior)*  
 Melanie Gareau, Ph.D., Assistant Adj. Professor  
*(VM Anatomy, Physiology and Cell Biology)*  
 Damian Genetos, Ph.D., Assistant Professor  
*(VM Anatomy, Physiology and Cell Biology)*  
 Aldrin Gomes, Ph.D., Associate Professor  
*(Neurobiology, Physiology, and Behavior)*  
 Eleonora Grandi, Ph.D., Assistant Professor  
*(Medical Pharmacology)*  
 Leigh Griffiths, Ph.D., Assistant Professor  
*(VM: Medicine and Epidemiology)*  
 Fawaz Haj, Ph.D., Professor *(Nutrition)*  
 Peter J. Havel, D.V.M., Ph.D., Professor  
*(Molecular Biosciences)*  
 Barbara A. Horwitz, Ph.D., Professor  
*(Neurobiology, Physiology, and Behavior)*  
 Mark Huising, Ph.D., Assistant Professor  
*(Neurobiology, Physiology, and Behavior)*  
 Andrew T. Ishida, Ph.D., Professor  
*(Neurobiology, Physiology, and Behavior)*  
 Lee-Way Jin, Ph.D., Associate Professor  
*(MIND Institute)*  
 James H. Jones, D.V.M., Ph.D., Professor  
*(Surgical and Radiological Sciences)*  
 Paul Knoepfler, Ph.D., Associate Professor  
*(Genome Center)*  
 Anne A. Knowlton, M.D., Professor  
*(Cardiovascular Medicine)*  
 Dietmar Kuehl, Ph.D., Professor *(Animal Science)*  
 Pamela Lein, Ph.D., Professor  
*(Molecular Biosciences)*  
 Yu-Fung Lin, Ph.D., Associate Professor  
*(Physiology and Membrane Biology)*  
 K.C. Kent Lloyd, D.V.M., Ph.D., Professor  
*(VM: Anatomy, Physiology and Cell Biology)*  
 Veronica Martinez-Cerdeno, Ph.D., Assistant Professor  
*(Pathology)*  
 Stuart A. Meyers, Ph.D., Professor  
*(VM: Anatomy, Physiology and Cell Biology)*  
 William Murphy, Ph.D., Professor *(Dermatology)*  
 Manuel Navedo, Ph.D., Associate Professor  
*(Medical Pharmacology)*  
 Martha E. O'Donnell, Ph.D., Professor  
*(Physiology and Membrane Biology)*  
 Anita M. Oberbauer, Ph.D., Professor  
*(Animal Science)*  
 John A. Payne, Ph.D., Professor  
*(Physiology and Membrane Biology)*  
 Isaac N. Pessah, Ph.D., Professor  
*(Molecular Biosciences)*

Helen E. Raybould, Ph.D., Professor  
*(Anatomy, Physiology and Cell Biology)*  
 David Richman, M.D., Professor  
*(Medical Neurology)*  
 Michael Rogawski, M.D./Ph.D., Professor  
*(Medical Neurology)*  
 John C. Rutledge, M.D., Professor  
*(Internal Medicine)*  
 Karen Ryan, Ph.D., Assistant Professor  
*(Neurobiology, Physiology and Behavior)*  
 Jon Sack, Ph.D., Assistant Professor  
*(Physiology and Membrane Biology)*  
 Luis Santana, Ph.D., Professor  
*(Physiology and Membrane Biology)*  
 Saul Schaerf, M.D., Professor *(Internal Medicine)*  
 Edward S. Schelegle, Ph.D., Associate Research Physiologist *(VM: Anatomy, Physiology and Cell Biology)*  
 David Segal, Ph.D., Professor *(Genome Center)*  
 Frank Sharp, Ph.D., Professor *(Med. Neurology)*  
 Charles L. Stebbins, Ph.D., Professor *(Internal Medicine, Physiology and Membrane Biology)*  
 Danielle Stolzenberg, Ph.D., Assistant Professor  
*(Psychology)*  
 Lin Tian, Ph.D., Assistant Professor  
*(Biochemistry and Molecular Medicine)*  
 Catherine VandeVoort, Ph.D., Adjunct Professor  
*(Obstetrics and Gynecology)*  
 Amparo Villablanca, M.D., Professor  
*(Internal Medicine)*  
 Peter C. Wainwright, Ph.D., Professor  
*(Evolution and Ecology)*  
 Peter C. Wainwright, Ph.D., Professor  
*(Population Biology/Evolution and Ecology)*  
 Robert H. Weiss, M.D., Professor *(Internal Medicine)*  
 John Wingfield, Ph.D., Professor  
*(Neurobiology, Physiology, and Behavior)*  
 Kevin Xiang, Ph.D., Professor  
*(Medical Pharmacology)*  
 Vladimir Yarov-Yarovoy, Ph.D., Associate Professor  
*(Physiology and Membrane Biology)*  
 Clare E. Yellowley, Ph.D., Professor  
*(VM: Anatomy, Physiology and Cell Biology)*  
 Konstantinos Zarbalis, Ph.D., Assistant Professor  
*(Pathology)*  
 Jie Zheng, Ph.D., Associate Professor  
*(Physiology and Membrane Biology)*  
 Karen Zito, Ph.D., Associate Professor  
*(Neurobiology, Physiology, and Behavior)*

## Emeriti Faculty

John M. Horowitz, Ph.D., Professor Emeritus

**Graduate Study.** The Graduate Group in Molecular, Cellular, and Integrative Physiology offers programs of study and research leading to the M.S. and Ph.D. degrees and participates in joint Ph.D./M.D. and Ph.D./D.V.M. programs. The programs emphasize broad training in the fundamental principles of cellular, molecular, and integrative physiology.

**Graduate Adviser.** Chao-Yin Chen

**Master Advisers.** Gretchen Casazza, Nipavan Chiamvimonvat, Eleonora Grandi

## Courses in Molecular, Cellular, and Integrative Physiology (MCP)

*(Formerly courses in Physiology)*

### Graduate

#### 200L. Animal Cell Culture Laboratory (4)

Discussion—2 hours; laboratory—6 hours. Prerequisite: courses in undergraduate biochemistry, cell biology, or general physiology, or consent of instructor. Techniques of cell culture, with emphases on cell physiology and the actions of drugs and toxicants on cultured somatic cells. Design, performance and interpretation of experiments with animal cells in vitro.—W. (W.) Ross, Pablo

#### 210A. Advanced Physiology (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Physiology Ph.D. program, or consent of instructor. Advanced course in general principles of physiology, surveying homeostasis, cellular and selected topics, and neurophysiology. *(Same course as Human Physiology 210A)*—F. (F.) Zheng

## 210B. Advanced Physiology (6)

Lecture—5 hours; discussion—1 hour. Prerequisite: Physiology 210A; Physiology Ph.D. program, or consent of instructor. Advanced course on general principles of physiology, surveying homeostasis, cellular and selected topics, and neurophysiology.—W. (W.) Chen, Bossuyt

## 210C. Advanced Physiology (5)

Lecture—5 hours. Prerequisite: doctoral student in the Molecular, Integrative and Comparative Physiology Graduate Group, or consent of instructor. Graduate level instruction in the general principles of physiology and the neural and humoral control of the cardiovascular, renal, respiratory, gastrointestinal, sensory, musculoskeletal, and reproductive systems.—S. (S.) Navedo, Xiang

## 210L. Physiology Laboratory Rotations (5)

Laboratory—15 hours. Restricted to Molecular, Cellular and Integrative Physiology (MCIP) graduate students. One mandatory rotation and up-to two voluntary rotations. Students learn techniques and perform experiments related to particular research problems. At the end of the rotations students give a short talk and hand in a research paper. May be repeated two times for credit. *(S/U grading only.)*—F. W. (F. W.) Sack, Yarov-Yarovoy

## 215. Electrophysiology Techniques and Applications (3)

Lecture—1.5 hours; discussion—1.5 hours. Broad scope of topics in electrophysiology techniques and applications. *(Same course as Pharmacology and Toxicology 215.)* *(S/U grading only.)*—S. (S.) Chen

## 216. Neurophysiology Literature (3)

Lecture—1 hour; discussion—2 hours. Lectures covering experimental and theoretical methods in studying cell membrane ion channels and the resulting characterization of the physiological functions and structure/function relationships of some of the most important channel types. Discussion of classical and current original papers.—F. (F.)

## 219. Muscle Growth and Development (3)

Lecture—2 hours; seminar—1 hour. Prerequisite: Biological Sciences 103, Biological Sciences 104 or Molecular and Cellular Biology 150, or consent of instructor. Integration of growth and development of skeletal muscle; morphology, biochemistry, neural control mechanisms, circulatory and nutritional factors. Prenatal and neonatal differentiation of fiber types. Experimental and hereditary myopathies. Offered in alternate years.—S. Bodine, Carlsen

## 220. General and Comparative Physiology of Reproduction (3)

Lecture—3 hours. Prerequisite: Neurobiology, Physiology, and Behavior 110, 110L; Biological Sciences 101, 103. Basic phenomena of sexual and asexual reproduction and comparisons of processes in a wide variety of animals; gamete formation, structure, and metabolism; fertilization; neuroendocrine mechanisms in maturation and reproductive cycles; behavioral aspects.—S. (S.) Adams, Berger, Conley

## 222. Mammalian Gametogenesis and Fertilization (3)

Lecture/discussion—3 hours. Prerequisite: Neurobiology, Physiology, and Behavior 121 or the equivalent. Course will emphasize our current understanding of events in mammalian gametogenesis and the fertilization process. Published results, conclusions drawn from these results, and their contribution to our understanding will be discussed.—S. (S.) Berger

## 230. Advanced Endocrinology (2)

Lecture—2 hours. Prerequisite: Neurobiology, Physiology, and Behavior 130 or the equivalent, and graduate standing. Focus on timely topic of endocrine research. Critical review of current literature and discussion of future research strategies in the area. May be repeated for credit when topic differs.

## 231. Neuroendocrinology (3)

Lecture—3 hours. Prerequisite: Neurobiology, Physiology, and Behavior 110 or the equivalent course in systemic physiology; Neurobiology, Physiology, and Behavior 130 or the equivalent course in endocrinol-

ogy. Neural-endocrine interactions; neural regulation of the endocrine system, especially in relation to reproduction; the role of hormones and growth factors in sexual differentiation of the brain.

### **234. Current Topics in Neurotoxicology (3)**

Lecture—3 hours. Prerequisite: core courses in one of the following graduate programs: Pharmacology and Toxicology, Agricultural and Environmental Chemistry, Biochemistry and Molecular Biology, Cell and Developmental Biology, Immunology, Molecular Cellular and Integrative Physiology or Neuroscience. Restricted to upper level undergraduate students must obtain permission from the course coordinator. General principles of neurotoxicology, the cell and molecular mechanisms and health impacts of specific neurotoxicants and the contribution of neurotoxic compounds to complex neurodevelopmental disorders and neurodegenerative diseases. (Same course as Environmental Toxicology 234 and Molecular Biosciences 234.) Offered in alternate years.—W. Lein

### **242. Biological Rhythms (3)**

Lecture—2 hours; lecture/discussion—1 hour. Prerequisite: Neurobiology, Physiology, and Behavior 110 or the equivalent. General aspects and basic mechanisms of biological rhythms; the importance of rhythm desynchronization in areas of pharmacology and space medicine; telemetry; mathematical methods; chronometry; daily, reproductive, and annual periods; shift-work, jet lag and sleep disorders. Offered in alternate years.—(F.) Fuller

### **255. Physiology of the Stress Response (2)**

Lecture/discussion—2 hours. Prerequisite: graduate student status. Definition of Stress; Physiological mechanisms of adaptation to stress; Hormonal control of the systemic stress response; Mechanisms of the cellular stress response; Discussion of current trends in stress physiology and current methods for studying the stress response. (Same course as Animal Biology 255.)—S. (S.) Kueltz

### **261A. Topics in Vision: Eyes and Retinal Mechanisms (2)**

Lecture/discussion—2 hours. Prerequisite: graduate standing, Neurobiology, Physiology, and Behavior 100 or 112 or the equivalent. Structure and function of the visual system, with emphasis on the eye and retina, including optics, anatomy, transduction, retinal synapses, adaptation, and parallel processing. (Same course as Neuroscience 261A and Neurobiology, Physiology, and Behavior 261A.) (S/U grading only.)—F. (F.) Ishida

### **261B. Topics in Vision: Systems, Psychophysics, Computational Models (2)**

Lecture/discussion—2 hours. Prerequisite: consent of instructor; course 261A recommended. Functions of the central visual pathways and their underlying mechanisms. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system. (Same course as Neuroscience 261B and Neurobiology, Physiology, and Behavior 261B.) (S/U grading only.) Offered in alternate years.—W. Britten

### **261C. Topics in Vision: Clinical Vision Science (2)**

Lecture/discussion—2 hours. Prerequisite: courses 261A and 261B, or consent of instructor. Causes and mechanistic bases of major blinding diseases. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system related to disease. (Same course as Neuroscience 261C and Neurobiology, Physiology, and Behavior 261C.) (S/U grading only.) Offered irregularly.—S. Werner

### **275. Neurohumoral Regulatory Mechanisms of Thermogenesis (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 104 or the equivalent; Biological Sciences 102 or the equivalent; consent of instructor. Designed for graduate and advanced undergraduate students, this course will examine thermogenic systems in homeotherms (primarily

mammals) with respect to regulation (hormonal and central nervous control) and effector mechanisms (basis of heat generation at the target cell).

### **290. Seminar (1)**

Seminar—1 hour. Discussion and critical evaluation of advanced topics and current trends in research. (S/U grading only.)—F, W, S. (F, W, S.)

### **290C. Research Conference in Physiology (1)**

Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Presentation and discussion of faculty and graduate student research in physiology. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

### **291B. Seminar in Cellular Mechanisms of Adaptation (1)**

Discussion—0.5 hour; seminar—0.5 hour. Prerequisite: Neurobiology, Physiology, and Behavior 100B; Biological Sciences 103; consent of instructor. Review and evaluation of current literature and research in cellular adaptations to the environment. May be repeated for credit when topic differs. (S/U grading only.)

### **291D. Research Approaches in Physiology (2)**

Seminar—2 hours. Prerequisite: graduate standing in Graduate Group in Physiology or consent of instructor. Current research in physiology. Overall design of experiments and particular research areas. (S/U grading only.)—F. (F.) Chen, Grandi

### **293. Current Progress in Physiology (1)**

Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Seminars presented by guest lecturers describing their current research activities. May be repeated for credit. (S/U grading only.)

### **298. Group Study (1-5)**

### **299. Research (1-12)**

(S/U grading only.)

### **Professional**

### **300A. Pedagogical Aspects of Physiology in Higher Education (3)**

Lecture; discussion; laboratory. Prerequisite: meet qualifications for teaching assistant in physiology. Participation as a teaching assistant for one quarter in a designated physiology course. Instruction in methods of leading discussion groups, leading laboratory sections, writing and grading quizzes, operation and use of laboratory equipment, and reading and grading laboratory reports. Course meets teaching requirements for Ph.D. program in Physiology. (S/U grading only.)—F, W, S. (F, W, S.)

### **300B. Pedagogical Aspects of Physiology in Higher Education (3)**

Lecture; discussion; laboratory. Prerequisite: meet qualifications for teaching assistant in physiology. Participation as a teaching assistant for one quarter in a designated physiology course. Instruction in methods of leading discussion groups, leading laboratory sections, writing and grading quizzes, operation and use of laboratory equipment, and reading and grading laboratory reports. Course meets teaching requirements for Ph.D. program in Physiology. (S/U grading only.)—F, W, S. (F, W, S.)

### **390. The Teaching of Physiology (1)**

Discussion—1 hour. Prerequisite: Teaching Assistant assignment to a physiology lecture course and consent of instructor. Practical experience in methods and problems of teaching physiology lecture courses. May include analyses of texts and supporting material, discussion of teaching techniques, preparing for and conducting discussion sessions, and formulation of topics and questions for examinations under supervision of instructor. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## **MUSIC**

(College of Letters and Science)

Henry Spiller, Ph.D., Chairperson of the Department

**Department Office.** 112 Music Building  
530-752-5537; Fax 530-752-0983;  
<http://music.ucdavis.edu>

### **Faculty**

Christian Baldini, Ph.D., Associate Professor

Ross Bauer, Ph.D., Professor

Anna Maria Busse Berger, Ph.D., Professor

Carol Hess, Ph.D., Professor

Katherine In-Young Lee, Ph.D., Assistant Professor

Beth Levy, Ph.D., Associate Professor

Jessie Ann Owens, Ph.D., Professor

Pablo Ortiz, D.M.A., Professor

Miko Pelo, Ph.D., Associate Professor

Christopher A. Reynolds, Ph.D., Professor

*Academic Senate Distinguished Teaching Award,  
UC Davis Prize for Teaching and Scholarly  
Achievement*

Kurt Rohde, M.M., Professor

Laurie San Martin, Ph.D., Professor

Henry Spiller, Ph.D., Professor

Jeffrey Thomas, Professor

### **Emeriti Faculty**

Robert S. Bloch, M.A., Professor Emeritus

Andrew D. Frank, M.A., Professor Emeritus

D. Kern Holoman, Ph.D., Professor Emeritus

*Academic Senate Distinguished Teaching Award,  
UC Davis Prize for Teaching and Scholarly  
Achievement*

Albert J. McNeil, M.S., Professor Emeritus

David A. Nutter, Ph.D., Professor Emeritus

Wayne Slawson, Ph.D., Professor Emeritus

### **Affiliated Faculty**

Phoebe Craig, M.M., Lecturer

Sam Nichols, Ph.D., Lecturer

*Academic Federation Award for Excellence in  
Teaching*

Robert Sabino, Lecturer

Amelia Triest, B.A., Lecturer

### **Faculty Affiliates in Applied Music**

Lois Brandwynne, M.A., Lecturer (piano)

Tod Brody, B.A., Lecturer (flute)

Scott Choate, Lecturer (tuba)

Bruce Chrisp, M.M., Lecturer (trombone)

Susan Lamb Cook, M.A., Lecturer (cello)

Phoebe Craig, M.M., Lecturer (harpsichord)

Thomas Derthick, B.M., Lecturer (double bass)

Daniel Flanagan, M.M., Lecturer (violin)

Jolán Friedhoff, M.M., Lecturer (violin)

Christopher Froh, M.M., Lecturer (percussion)

Michael Goldberg, M.A., Lecturer (guitar)

Sam Griffith, D.M.A., Lecturer (Jazz)

Ann Lavin, D.M.A., Lecturer (clarinet)

Scott Macomber, M.M., Lecturer (trumpet)

Zoila Muñoz, M.M. Lecturer (voice)

Jonathan Nadel, M.M., Lecturer (voice)

Peter Nowlen, B.M., Lecturer (French horn)

Michael Seth Orland, A.B., Lecturer (piano)

Stacey Pelinka, M.M., Lecturer (flute)

Laura Reynolds, M.M., Lecturer (oboe)

Ellen Ruth Rose, M.M., Lecturer (viola)

Rita Sahai, M.A., Lecturer (Hindustani vocal music)

Michael Sand, M.M., Lecturer (violin)

Dagenais Smiley, M.M., Lecturer (violin)

Kevin Stewart, B.M., Lecturer (saxophone)

Marilyn Swan, B.M., Lecturer (piano)

### **The Major Program**

The Bachelor of Arts degree in music provides both a broad liberal arts education and the skills necessary to explore music through its history, composition, theory, and performance. Students majoring in music may choose from three tracks in the major: (1) composition, (2) music history, theory, and ethnomusicology, or (3) performance. After a common core of courses in the lower division, students pursue

their chosen track with specialized courses leading to an appropriate senior project.

All majors are expected to complete a substantial project (composition, research presentation, recital) in the senior year (Music 195). Music majors who intend to pursue graduate studies in music are encouraged to satisfy the requirements of one of the honors programs in music.

**Study Abroad and the Music Major.** The department encourages students to pursue a portion of their studies abroad. In close collaboration with their undergraduate advisers, students plan a course of study abroad that complements their coursework at Davis. UC Davis Music majors have completed upper division coursework at EAP partner institutions in Australia, England, France, Germany, and Italy; Music faculty members lead summer programs in Argentina and Austria.

**The Program.** A fundamental grounding in music theory, music history, and performance during the first two years of study leads to more specialized study of composition, history, or performance during the last two years of undergraduate work.

**Career Alternatives.** Students who graduate with a B.A. in music from UC Davis have gone on to careers as composers and performers, in academia, and in the concert, media, and computing industries. Others have continued in medicine, law and business.

### A.B. Major Requirements:

#### UNITS Preparatory Subject Matter ..... 27-45

Music 6A, 6B, 6C .....	9
Plus Music 2A, 2B, 2C .....	(0-6)*
And Music 16A, 16B, 16C .....	(0-6)*
Music 7A, 7B, 7C .....	9
Plus Music 17A, 17B, 17C .....	(0-6)*
Music 24A, 24B, 24C .....	9

\* May be excused by diagnostic examination at the beginning of each quarter.

#### Depth Subject Matter ..... 40-43

Choose upper division courses from one of the following tracks:

Track 1: Music Composition.....	42
Music 123, 124A, 124B.....	9
Music 121 or 122.....	4
Music 131 (three quarters) .....	6
Music 195.....	2
At least 6 units selected from: Music 140-151.....	6
Music 101A, 101B.....	8
Music 103.....	3
At least 4 further units selected from:	
Music 102, 105, 106, 107A, 107B, 108A, 108B, 110A-G, 113, 114, 115, 116, 121, 122, 126, 129A-D, 192, 198, 199.....	4

Track 2: Music History, Theory, and Ethnomusicology .....	43
Music 123, 124A, 124B.....	9
Music 121 and/or 122.....	8
Music 131 (three quarters) .....	6
Music 195.....	2
At least 6 units selected from: Music 140-151 .....	6

At least 12 further units selected from:	
Music 101A, 101B, 102, 105, 106, 108A, 108B, 110A-G, 113, 114, 115, 116, 121, 122, 126, 129A-D, 192, 198, 199 .....	12

Track 3: Music Performance.....	40
Music 123, 124A, 124B.....	9
Music 121 or 122.....	4
Music 131 (three quarters) .....	6
Music 195.....	2
At least 13 units selected from: Music 131, 140-151 .....	13

At least 6 further units selected from:	
Music 101A, 101B, 102, 105, 106, 108A, 108B, 110A-G, 113, 114, 115, 116, 121, 122, 126, 129A-D, 174-178-17C at the beginning of each year. Transfer students should	
Quarter Offered: F=Fall, W=Winter, S=Spring, Su=Summer; 2017-2018 offering in parentheses	

116, 121, 122, 126, 129A-D, 192, 198, 199 .....	6
---	---

#### Total Units for the Major ..... 64-85

**Note:** A maximum of 19 units in performance courses (Music 131, 140-151) apply toward the degree; see Unit Credit Guidelines, College of Letters and Science degree requirements section. Faculty of the College of Letters and Science bylaws makes it possible for students to take more than 19 units of performance classes without those additional units counting toward the 225-unit cap on units:

Composition Honors Track.....	46-50
Music 101A, 101B .....	8
Music 123, 124A, 124B .....	9
Music 103.....	3
Music 121 or 122.....	4
Music 131 (one year) .....	6
At least six units selected from: Music 140-151 .....	6

Two quarters of Music 194H for a total of at least six units resulting in a Senior thesis .....	6
At least four-eight further units from: Music 102, 105, 106, 107A, 107B, 107C, 108A, 108B, 110A-G, 113, 114, 115, 116, 121, 122, 126, 129A-D, 192, 198, 199 .....	4-8
Music History, Theory and Ethnomusicology Honors Track .....	47
Music 123, 124A, 124B .....	9
Music 121 and/or 122 .....	8
Music 131 (three quarters) .....	6
At least 6 units selected from: Music 140-151 .....	6

Two quarters of Music 194H for a total of at least 6 units resulting in a Senior thesis .....	6
At least 12 further units selected from:	
Music 101A, 101B, 102, 105, 106, 108A, 108B, 110A-G, 113, 114, 115, 116, 121, 122, 126, 129A-D, 192, 198, 199 .....	12

A student becomes eligible for graduation with honors by meeting the minimum GPA and course requirements established by the College of Letters and Science. To qualify for high or highest honors, students must also complete the Music Department honors program with a GPA of 3.500 or above and write a thesis or submit a portfolio that meets the criteria for high honors or highest honors. Students apply to participate in the department honors program during the latter part of their junior year. Admission to the program is based on GPA, a thesis proposal, examples of previous writing, and the recommendation of a faculty member who is willing to sponsor the student's project. Students who anticipate seeking admission to the honors program are urged to complete at least one offering of Music 121 or 122 before the end of their junior year. Interested students are urged to consult with faculty in their field early in their junior year.

**Major Advisers.** C. Reynolds (A-F), A. Triest (G-M), L. San Martin (N-Z)

#### Minor Program Requirements:

#### UNITS Music ..... 22

A minimum of 16 units of upper division Music courses .....	16
Courses chosen from: Music 105, 106, 107A, 107B, 110A-G, 115, 116, 126, 129A-D .....	6
A minimum of six units in upper division music performance courses .....	6
Courses chosen from: Music 140-151 .....	6

**Foreign Language.** Students contemplating graduate study in music are advised to consider pursuing foreign language study beyond the elementary level.

**Diagnostic Exams** are given before admission into Music 6A-6B-6C. As an alternative Music 3A-3B may be recommended. Diagnostic exams are also given for Music 16A-16B-16C and 17A-17B-17C at the beginning of each year. Transfer students should

take the Music 6 diagnostic exam given during the first class meetings.

**Beginning and transfer students** are required to take Music 2A-2B-2C (Keyboard Competence) unless they can pass out of one or more of the classes by demonstrating proficiency through a diagnostic exam given at the beginning of each quarter. Students learn (1) four-part keyboard harmony in all major and minor keys; (2) moderate fluency with figured bass at the keyboard; (3) major and minor scales with proper fingering; ability to sight read simple piano music and Bach chorales.

**Student Performing Activities.** The Department of Music presents more than 100 concerts each year, offering performance opportunities for both majors and non-majors in the UC Davis Symphony Orchestra, University Chorus, Concert Band and Wind Ensemble, Early Music Ensemble, Baroque Chamber Orchestra, Jazz Band, world music ensembles (Gamelan, Samba School, Hindustani Vocal Ensemble, Korean Drumming Ensemble) and numerous chamber ensembles. There is a close relationship with the Robert and Margrit Mondavi Center for the Performing Arts, where several of the ensembles are resident.

Chamber ensembles perform frequently in the popular weekly Thursday Noon Concerts. Performance groups have collaborated with the Department of Theatre and Dance in productions of musical theater and opera. Study of instruments and voice with professional performers and teachers is required of all majors. Similar opportunities exist for qualified non-majors.

**Faculty and Facilities.** The faculty is noted for its achievements in a variety of areas. The music scholars are active in research, writing, and performance; the music of the composers is performed and recorded nationally and internationally. The journal, *19th-Century Music*, is housed in the department.

The regular faculty is joined throughout the year by visiting Artists-in-Residence, distinguished performers who give public concerts and lectures and who work with students informally.

The Empyrean Ensemble, a professional new music ensemble, is in residence at UC Davis, where it annually premieres the work of student composers. The American Bach Soloists, an ensemble of professional singers and instrumentalists specializing in music of the late 18th and early 19th centuries, is affiliated with the Department of Music.

The department's facilities include a large collection of Renaissance, Baroque, and modern instruments, along with non-western instruments including a Sundanese gamelan. The arts quadrangle houses the Computer and Electronic Music Studio, practice and rehearsal rooms, and an music library with well over 12,000 CDs, several hundred videos and a collection of music reference materials. The newly-opened Ann E. Pitzer Center, next door to the Music Building, features a 399-seat state-of-the-art concert hall, six practice rooms, and four large teaching/rehearsal studios. Scores and music monographs are housed in the Peter J. Shields Library, adjacent to the Music Building. A partnership of campus libraries affords online access to more than 100,000 tracks of classical and world music by streaming audio.

**Graduate Study.** The Department of Music offers programs of study and research leading to the M.A. degree in composition/theory, musicology, ethnomusicology, and conducting, and the Ph.D. degree in composition/theory, musicology, and ethnomusicology. Detailed information regarding graduate study may be obtained from the Graduate Adviser.

**Graduate Advisers.** K. Rohde, C. Hess

#### Courses in Music (MUS)

#### Lower Division

#### 2A. Keyboard Competence, Part 1 (2)

Performance—2 hours. Prerequisite: course 6A and 16A required concurrently. Training to meet the minimum piano requirements for the major in music.

Scales and simple harmonic progressions in twelve keys, both major and minor. (P/NP grading only.) GE credit: AH.—F. (F.) Triest

### **2B. Keyboard Competence, Part 2 (2)**

Performance—2 hours. Prerequisite: course 6B and course 16B required concurrently; completion of course 2A or demonstration of required keyboard proficiency level on diagnostic exam; consent of instructor. Training to meet the minimum piano requirements for the major in music. Harmonic progressions, modulations and score reading at the piano. (P/NP grading only.) GE credit: AH.—W. (W.) Triest

### **2C. Keyboard Competence, Part 3 (2)**

Performance—2 hours. Prerequisite: course 6C and course 16C required concurrently; completion of course 2B or demonstration of required keyboard proficiency level on diagnostic exam; consent of instructor. Training to meet the minimum piano requirements for the major in music. Harmonic progressions, figured bass realization, sight reading and keyboard repertory. (P/NP grading only.) GE credit: AH.—S. (S.) Triest

### **3A. Introduction to Music Theory, Part 1 (4)**

Lecture—1 hour; recitation—3 hours. Fundamentals of music theory, ear-training, harmony, counterpoint, and analysis directed toward the development of listening and writing techniques. Intended for the general student. GE credit: ArtHum | AH.—F. W. (F. W.) Triest

### **3B. Introduction to Music Theory, Part II (4)**

Lecture—1 hour; recitation—3 hours. Prerequisite: completion of course 3A or consent of instructor. Continuation of course 3A. Development of melodic and harmonic writing skills. Basic analysis training. Intended for the general student. GE credit: ArtHum | AH.—W. S. (W. S.) Craig, Triest

### **6A. Elementary Theory, Part 1 (3)**

Lecture—3 hours. Prerequisite: course 2A and course 16A required concurrently. Development of music writing and listening skills through the study of music fundamentals, species counterpoint, harmony, analysis of repertory. Intended primarily for music majors. GE credit: ArtHum | AH.—F. (F.) Nichols

### **6B. Elementary Theory, Part 2 (3)**

Lecture—3 hours. Prerequisite: course 2B and course 16B required concurrently; completion of course 6A or demonstration of required proficiency level on diagnostic exam. Continuation of course 6A. GE credit: ArtHum | AH.—W. (W.) Nichols

### **6C. Elementary Theory, Part 3 (3)**

Lecture—3 hours. Prerequisite: course 2C and course 16C required concurrently; completion of course 6B or demonstration of required proficiency level on diagnostic exam. Continuation of courses 6A-B. GE credit: ArtHum | AH.—S. (S.) Nichols

### **7A. Intermediate Theory, Part 1 (3)**

Lecture—3 hours. Prerequisite: course 6C; course 17A concurrently. Homophony music of the Classical era with a focus on analysis of music by Haydn, Mozart, and Beethoven. Composition of pieces in the homophony forms such as minuet and trio, theme and variations, rondo and sonata. Intended for music majors. GE credit: ArtHum | AH.—F. (F.) Bauer, Pelo, Rohde, San Martin

### **7B. Intermediate Theory, Part 2 (3)**

Lecture—3 hours. Prerequisite: course 7A; course 17B concurrently. Nineteenth-century harmony and voice leading through the music of the Romantic era. Focus on analysis of music by Chopin, Schumann, Brahms, Wagner, and Wolf. Composition of character pieces and songs. Intended for Music majors. GE credit: ArtHum | AH.—W. (W.) Bauer, Pelo, Rohde, San Martin

### **7C. Intermediate Theory, Part 3 (3)**

Lecture—3 hours. Prerequisite: course 7B; course 17C concurrently. The music of the first thirty years of the twentieth century and various analytical tools pertaining to it. Works of Debussy, Stravinsky, Schoenberg, Berg, and others. Composition of small

pieces for solo instruments, voice and piano. Intended for Music majors. GE credit: ArtHum | AH.—S. (S.) Bauer, Pelo, Rohde, San Martin

### **10. Introduction to Musical Literature (4)**

Lecture—3 hours; listening—1 hour. Introduction to composers and major styles of Western music. Lectures, listening sections, and selected readings. For non-majors. GE credit: ArtHum, Wrt | AH, VL, WC, WE.—F, W, S. (F, W, S.) Hess, Holoman, Levy, Pelo

### **11. Musics of the World (4)**

Lecture—3 hours; listening section—1 hour. Survey of selected art, folk, and popular music cultures from different parts of the world. Emphasis on understanding relationships of musical style, aesthetic principles, and performance practice to wider cultural contexts. GE credit: ArtHum, Div | AH, VL, WC.—W, S. (W, S.) Lee, Spiller

### **16A. Elementary Musicianship, Part 1 (2)**

Lecture/laboratory—2 hours. Prerequisite: course 2A and course 6A required concurrently. The melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis. GE credit: ArtHum | AH.—F. (F.) Triest

### **16B. Elementary Musicianship, Part 2 (2)**

Lecture/laboratory—2 hours. Prerequisite: course 2B and course 6B required concurrently; completion of course 16A or demonstration of required proficiency level on diagnostic exam. The melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis. GE credit: ArtHum | AH.—W. (W.) Triest

### **16C. Elementary Musicianship, Part 3 (2)**

Lecture/laboratory—2 hours. Prerequisite: course 2C and course 6C required concurrently; completion of course 16B or demonstration of required proficiency level on diagnostic exam. The melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis. GE credit: ArtHum | AH.—S. (S.) Triest

### **17A. Intermediate Musicianship, Part 1 (2)**

Lecture/laboratory—2 hours. Prerequisite: course 7A concurrently; completion of course 16C or demonstrate required proficiency level on diagnostic exam. Melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis. GE credit: ArtHum | AH—F. (F.) Craig

### **17B. Intermediate Musicianship, Part 2 (2)**

Lecture/laboratory—2 hours. Prerequisite: course 7B or 100B required concurrently; completion of course 17A or demonstration of required proficiency level on diagnostic exam. The melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis. GE credit: ArtHum | AH—W. (W.) Craig

### **17C. Intermediate Musicianship, Part 3 (2)**

Lecture/laboratory—2 hours. Prerequisite: course 7C concurrently; successful completion of course 17B or demonstrate required proficiency level on diagnostic exam. The melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis. GE credit: ArtHum | AH—S. (S.) Craig

### **24A. Introduction to the History of Music I (3)**

Lecture—3 hours. Prerequisite: can be concurrent with course 6A or consent of instructor. History of music from the late Baroque to Beethoven. Intended primarily for majors in music. GE credit: ArtHum, Wrt | AH, VL, WE.—F. (F.) Berger

### **24B. Introduction to the History of Music II (3)**

Lecture—3 hours. Prerequisite: completion of course 24A or consent of instructor. The history of music from the Romantic Period to the nineteenth century. Intended primarily for majors in music. GE credit: ArtHum, Wrt | AH, VL, WE.—W. (W.) Berger

### **24C. Introduction to the History of Music III (3)**

Lecture—3 hours. Prerequisite: completion of course 24B or consent of instructor. The history of music of the 20th century. Intended primarily for majors in music. GE credit: ArtHum, Wrt | AH, VL, WE.—S. (S.) Levy

### **28. Introduction to African American Music (4)**

Lecture/discussion—3 hours; discussion—1 hour; listening; project. Survey of African American music, such as spirituals, blues, ragtime, jazz, theater, gospel, R&B, rap, and art music. Emphasis on historical and sociocultural contexts, as well as African roots. GE credit: ArtHum, Div, Wrt | ACGH, AH, DD, VL, WE.—S. (S.)

### **98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) GE credit: AH.—F, W, S. (F, W, S.)

### **99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) GE credit: AH.—F, W, S. (F, W, S.)

### **Upper Division**

#### **101A. Advanced Theory, Part 1 (4)**

Lecture—3 hours; lecture/laboratory—1 hour. Prerequisite: completion of course 101A. Twentieth-century music from 1930 through 1950 and the various analytical tools pertaining to it. Works of Copland, Sessions, Schoenberg, Bartók, and Stravinsky. Composition of small pieces for piano and voice. GE credit: ArtHum | AH.—F. (F.) Bauer, Pelo, Rohde, San Martin

#### **101B. Advanced Theory, Part 2 (4)**

Lecture—3 hours; lecture/laboratory—1 hour. Prerequisite: course 101A. Music from 1950 to the present and the analytical tools pertaining to it. Works of Babbitt, Carter, Dallapiccola, Ligeti, Messiaen, Reich and others. Composition of small pieces for ensemble. GE credit: ArtHum | AH.—W. (W.) Bauer, Pelo, Rohde, San Martin

#### **102. Tonal Counterpoint (4)**

Lecture—3 hours; practice—1 hour. Prerequisite: course 7C. Imitative tonal counterpoint with an analytical focus on the Two-Part Inventions and fugues from The Well-Tempered Klavier by J. S. Bach. Composition of exercises and short pieces using contrapuntal techniques. Intended for music majors. GE credit: ArtHum | AH.—F. (F.) Bauer

#### **103. Workshop in Composition (3)**

Workshop—3 hours. Prerequisite: completion of course 6C or consent of instructor. Workshop in musical composition for undergraduates who are interested in pursuing serious compositional studies and intending to follow the composition track of the major. Course will explore the techniques and materials of musical composition. May be repeated for credit. GE credit: ArtHum | AH.—F, W, S. (F, W, S.) Bauer, Nichols, Ortiz, Pelo, Rohde, San Martin

#### **105. History and Analysis of Jazz (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: completion of course 10 or 3B or 28 or consent of instructor. Jazz and the evolution of jazz styles in historical and cultural context. For non-majors. GE credit: ArtHum, Div, Wrt | ACGH, AH, DD, WE.—F. (F.) Bauer

#### **106. History of Rock Music (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: completion of course 10 or 3B or consent of instructor. Rock and the evolution of rock styles in historical and cultural context. For non-majors. GE credit: ArtHum, Wrt | ACGH, AH, VL, WE.—W. (W.) Froh, Reynolds

**107A. Computer and Electronic Music (3)**

Lecture—3 hours; laboratory—1 hour. Prerequisite: consent of instructor. Limited enrollment. Studies in electronic and computer music composition. The principles and procedures of composition in various electronic media are explored through compositional exercises. GE credit: ArtHum | AH, -W. (W.) Nichols

**107B. Computer and Electronic Music (3)**

Lecture—3 hours; laboratory—1 hour. Prerequisite: completion of course 107A or consent of instructor. Limited enrollment. Continuation of course 107A. Offered in alternate years. GE credit: ArtHum | AH, -S. (S.) Nichols

**108A. Orchestration (2)**

Lecture—2 hours. Prerequisite: completion of course 6C or consent of instructor. Techniques of orchestration from study of basic instrumental techniques to analysis of orchestral scores and scoring for various instrumental combinations. GE credit: ArtHum | AH, VL, -W. (W.) Ortiz

**108B. Orchestration (2)**

Lecture—2 hours. Prerequisite: completion of course 108A or consent of instructor. Techniques of orchestration from study of basic instrumental techniques to analysis of orchestral scores and scoring for various instrumental combinations. GE credit: ArtHum | AH, VL, -W. (W.) Ortiz

**110A. The Music of a Major Composer: Beethoven (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: completion of course 10 or 3A or consent of instructor. The work of Beethoven will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. Offered in alternate years. GE credit: ArtHum, Wrt | AH, VL, WC, WE. —F. (F.)

**110B. The Music of a Major Composer: Stravinsky (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: completion of course 10 or course 3A or consent of instructor. The work of Stravinsky will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: ArtHum, Wrt | AH, VL, WC, WE.

**110C. The Music of a Major Composer: Bach (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: completion of course 10 or course 3A or consent of instructor. The work of Bach will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. Offered in alternate years. GE credit: ArtHum, Wrt | AH, VL, WC, WE.

**110D. The Music of a Major Composer: Mozart (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: completion of course 10 or 3A or consent of instructor. The work of Mozart will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. Offered in alternate years. GE credit: ArtHum, Wrt | AH, VL, WC, WE.

**110E. The Music of a Major Composer: Haydn (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: completion of course 10 or 3A or consent of instructor. The work of Haydn in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. Offered in alternate years. GE credit: ArtHum, Wrt | AH, VL, WC, WE.

**110F. American Masters (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: completion of course 10 or course 3A or consent of instructor. An overview of American concert music by master composers from Charles Ives to the present. Lectures, discussion/guided listening sections, and selected readings. For non-majors. Offered in alternate years. GE credit: ArtHum, Wrt | ACGH, AH, DD, VL, WE. —S. (S.) Levy

**110G. Music of a Major Composer—Handel (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: completion of course 10 or course 3A or consent of instructor. Work of Handel in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. Offered in alternate years. GE credit: ArtHum, Wrt | AH, VL, WVC, WE. —Thomas

**113. Introduction to Conducting (2)**

Lecture—1 hour; performance—1 hour. Prerequisite: completion of course 6C or consent of instructor. Principles and techniques of conducting as they apply to both choral and instrumental ensembles. GE credit: ArtHum | AH, -F, W. (F, W.) Baldini, Thomas

**114. Intermediate Conducting (2)**

Lecture—1 hour; performance—1 hour. Prerequisite: completion of course 113 or consent of instructor. Intermediate conducting with a continued focus on principles and techniques as they apply to both choral and instrumental ensembles. GE credit: ArtHum | AH, -W, S. (W, S.) Baldini, Thomas

**115. History of Film Music (4)**

Lecture—3 hours; film viewing—3 hours. Prerequisite: completion of course 10 or course 3A or consent of instructor. Film music from silent films to movies of the past decade. How music supports and shapes film narrative and structure. Use of jazz, rock and classical music in film. Offered in alternate years. Offered irregularly. GE credit: ArtHum, Wrt | AH, VL, WE. —F. (F.) Ortiz

**116. Introduction to the Music of The Beatles (4)**

Lecture—3 hours; listening—1 hour. Prerequisite: completion of course 10 or course 3A or consent of instructor. Survey of music of The Beatles, focusing on the songs of Lennon and McCartney. Emphasis on understanding their evolution as musicians, composers and cultural figures. Discussion of their musical influences in wider cultural contexts. GE credit: AH, VL, WVC. —S. (S.) Reynolds

**121. Topics in Music Scholarship (4)**

Seminar—4 hours. Prerequisite: course 6C and course 24C; or consent of instructor. Sources and problems of a historical period or musical style selected by the instructor and announced in advance. May be repeated for credit. GE credit: ArtHum | AH, OL, -F, W, S. (F, W, S.)

**122. Topics in Analysis and Theory (4)**

Seminar—4 hours. Prerequisite: course 6C and course 24C; or consent of instructor. Analysis of works of a composer or musical style selected by the instructor and announced in advance. Consideration of theoretical issues. May be repeated for credit. GE credit: ArtHum | AH, OL, -F, W, S. (F, W, S.)

**123. Music as Culture (3)**

Lecture/discussion—3 hours. Prerequisite: course 124B or consent of instructor. Introduction to the study of music in cross-cultural perspective. Basic theories and frameworks of ethnomusicology; in-depth case studies of three musical traditions from around the world. Intended for music majors. Offered in alternate years. GE credit: ArtHum | AH, WC, WE. —F. (F.) Lee, Spiller

**124A. History of Western Music: Middle Ages to 1600 (3)**

Lecture—3 hours. Prerequisite: course 24C or consent of instructor. Historical survey of composers and musical styles from the Middle Ages to the beginning of the 17th century. GE credit: ArtHum, Wrt | AH, VL, WE. —W. (W.) Berger, Owens

**124B. History of Western Music: 1600-1750 (3)**

Lecture—3 hours. Prerequisite: course 124A or consent of instructor. Historical survey of composers and musical styles from the late 1500s to the mid-18th century. GE credit: ArtHum, Wrt | AH, VL, WE. —S. (S.) Berger, Owens

**126. American Music (4)**

Lecture—3 hours; listening—1 hour. Prerequisite: course 10 or course 3A or consent of instructor. Introductory survey of American musics, including

Native American music, Hispanic polyphony, New England psalmody, and selected 20th-century composers and styles. Offered in alternate years. GE credit: ArtHum, Div, Wrt | ACGH, AH, DD, WE. —S. (S.) Hess, Levy

**127. Music from Latin America (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Examination of music from Latin America. Characteristic music (i.e., tango, bossa nova, salsa, musica motena, musica andina) as well as its implications in other musical genres. Taught in Spanish. Not open to students who taken Spanish 171 and 171S. (Same course as Spanish 171) May be repeated one time for credit when topic differs. Offered in alternate years. GE credit: ArtHum | AH, WC, -F. (F.) Hess, Irwin, Ortiz

**129A. Musics of the Americas (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or course 11 or course 3A or consent of instructor. Survey of music cultures from North, Central, and South America, including the Caribbean, with emphasis on the role of music in society and on the elements of music (instruments, theory, genres and form, etc.). Introduction to ethnomusicological theory, methods, approaches. Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, DD, VL, WC, WE.

**129B. Musics of Africa, Middle East, Indian Subcontinent (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or course 11 or course 3A or consent of instructor. Survey of music cultures with special emphasis on the role of music in society and on the elements of music (instruments, theory, genres and form, etc.). Introduction to ethnomusicological theory, methods, approaches. Offered irregularly. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.

**129C. Musics of East and Southeast Asia (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or course 11 or course 3A or consent of instructor. Survey of music cultures from Japan, China, Korea, Vietnam, and Indonesia, with special emphasis on the role of music in society and on the elements of music (instruments, theory, genres and form, etc.). Introduction to ethnomusicological theory, methods, approaches. Offered irregularly. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE. —W. (W.) Lee, Spiller

**129D. Folk Musics of Europe (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or course 11 or course 3A or consent of instructor. Survey of folk musics from all of Europe, with emphasis on the role of music in society and on the elements of music (instruments, genres, form, etc.). Introduction to ethnomusicological theory, methods, approaches. Offered irregularly. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.

**130A. Applied Study of Music: Advanced; Voice (1)**

Performance instruction—1 hour. Prerequisite: consent of instructor; admission by audition. Class instruction, arranged by section; Voice. Offered as demand indicates. May be repeated for credit. —F, W, S. (F, W, S.)

**130B. Applied Study of Music: Advanced; Piano (1)**

Performance instruction—1 hour. Prerequisite: consent of instructor; admission by audition. Class instruction, arranged by section; Piano. Offered as demand indicates. May be repeated for credit. —F, W, S. (F, W, S.)

**130C. Applied Study of Music: Advanced; Harpsichord (1)**

Performance instruction—1 hour. Prerequisite: consent of instructor; admission by audition. Class instruction, arranged by section; Harpsichord. Offered as demand indicates. May be repeated for credit. —F, W, S. (F, W, S.)

**130D. Applied Study of Music: Advanced; Organ (1)**

Performance instruction—1 hour. Prerequisite: consent of instructor; admission by audition. Class instruction, arranged by section; Organ. Offered as demand indicates. May be repeated for credit.—F, W, S. (F, W, S.)

**130E. Applied Study of Music: Advanced; Violin (1)**

Performance instruction—1 hour. Prerequisite: consent of instructor; admission by audition. Class instruction, arranged by section; Violin. Offered as demand indicates. May be repeated for credit.—F, W, S. (F, W, S.)

**130F. Applied Study of Music: Advanced; Viola (1)**

Performance instruction—1 hour. Prerequisite: consent of instructor; admission by audition. Class instruction, arranged by section; Viola. Offered as demand indicates. May be repeated for credit.—F, W, S. (F, W, S.)

**130G. Applied Study of Music: Advanced; Cello (1)**

Performance instruction—1 hour. Prerequisite: consent of instructor; admission by audition. Class instruction, arranged by section; Cello. Offered as demand indicates. May be repeated for credit.—F, W, S. (F, W, S.)

**130H. Applied Study of Music: Advanced; Double Bass (1)**

Performance instruction—1 hour. Prerequisite: consent of instructor; admission by audition. Class instruction, arranged by section; Double Bass. Offered as demand indicates. May be repeated for credit.—F, W, S. (F, W, S.)

**130I. Applied Study of Music: Advanced; Flute (1)**

Performance instruction—1 hour. Prerequisite: consent of instructor; admission by audition. Class instruction, arranged by section; Flute. Offered as demand indicates. May be repeated for credit.—F, W, S. (F, W, S.)

**130J. Applied Study of Music: Advanced; Oboe (1)**

Performance instruction—1 hour. Prerequisite: consent of instructor; admission by audition. Class instruction, arranged by section; Oboe. Offered as demand indicates. May be repeated for credit.—F, W, S. (F, W, S.)

**130K. Applied Study of Music: Advanced; Clarinet (1)**

Performance instruction—1 hour. Prerequisite: consent of instructor; admission by audition. Class instruction, arranged by section; Clarinet. Offered as demand indicates. May be repeated for credit.—F, W, S. (F, W, S.)

**130L. Applied Study of Music: Advanced; Bassoon (1)**

Performance instruction—1 hour. Prerequisite: consent of instructor; admission by audition. Class instruction, arranged by section; Bassoon. Offered as demand indicates. May be repeated for credit.—F, W, S. (F, W, S.)

**130M. Applied Study of Music: Advanced; French Horn (1)**

Performance instruction—1 hour. Prerequisite: consent of instructor; admission by audition. Class instruction, arranged by section; French Horn. Offered as demand indicates. May be repeated for credit.—F, W, S. (F, W, S.)

**130N. Applied Study of Music: Advanced; Trumpet (1)**

Performance instruction—1 hour. Prerequisite: consent of instructor; admission by audition. Class instruction, arranged by section; Trumpet. Offered as demand indicates. May be repeated for credit.—F, W, S. (F, W, S.)

**130O. Applied Study of Music: Advanced; Trombone (1)**

Performance instruction—1 hour. Prerequisite: consent of instructor; admission by audition. Class instruction, arranged by section; Trombone. Offered as demand indicates. May be repeated for credit.—F, W, S. (F, W, S.)

**130P. Applied Study of Music: Advanced; Tuba (1)**

Performance instruction—1 hour. Prerequisite: consent of instructor; admission by audition. Class instruction, arranged by section; Tuba. Offered as demand indicates. May be repeated for credit.—F, W, S. (F, W, S.)

**130Q. Applied Study of Music: Advanced; Percussion (1)**

Performance instruction—1 hour. Prerequisite: consent of instructor; admission by audition. Class instruction, arranged by section; Percussion. Offered as demand indicates. May be repeated for credit.—F, W, S. (F, W, S.)

**130R. Applied Study of Music: Advanced; Classical (1)**

Performance instruction—1 hour. Prerequisite: consent of instructor; admission by audition. Class instruction, arranged by section; Classical. Offered as demand indicates. May be repeated for credit.—F, W, S. (F, W, S.)

**130U. Applied Study of Music: Advanced; Recorder (1)**

Performance instruction—1 hour. Prerequisite: open to Music majors with ability to perform scales and short compositions from standard repertoire; admission by audition and consent of instructor. Class instruction, arranged by section; Recorder.

**131A. Applied Study of Music: Advanced (Individual); Voice (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: course 1 or the equivalent; open to Music majors only; admission by audition and consent of instructor. Individual instruction in Voice. May be repeated for credit.—F, W, S. (F, W, S.)

**131B. Applied Study of Music: Advanced (Individual); Piano (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Piano. May be repeated for credit.—F, W, S. (F, W, S.)

**131C. Applied Study of Music: Advanced (Individual); Harpsichord (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Harpsichord. May be repeated for credit.—F, W, S. (F, W, S.)

**131D. Applied Study of Music: Advanced (Individual); Organ (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Organ. May be repeated for credit.—F, W, S. (F, W, S.)

**131E. Applied Study of Music: Advanced (Individual); Violin (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Violin. May be repeated for credit.—F, W, S. (F, W, S.)

**131F. Applied Study of Music: Advanced (Individual); Viola (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: open to Music majors only; admission by audition and consent of instructor. Individual instruction in Viola. May be repeated for credit.—F, W, S. (F, W, S.)

**131G. Applied Study of Music: Advanced (Individual); Cello (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Cello. May be repeated for credit.—F, W, S. (F, W, S.)

**131H. Applied Study of Music: Advanced (Individual); Double Bass (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Double Bass. May be repeated for credit.—F, W, S. (F, W, S.)

**131I. Applied Study of Music: Advanced (Individual); Flute (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Flute. May be repeated for credit.—F, W, S. (F, W, S.)

**131J. Applied Study of Music: Advanced (Individual); Oboe (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: admission by audition. Individual instruction in Oboe. May be repeated for credit.—F, W, S. (F, W, S.)

**131K. Applied Study of Music: Advanced (Individual); Clarinet (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Clarinet. May be repeated for credit.—F, W, S. (F, W, S.)

**131L. Applied Study of Music: Advanced (Individual); Bassoon (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Bassoon. May be repeated for credit.—F, W, S. (F, W, S.)

**131M. Applied Study of Music: Advanced (Individual); French Horn (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in French Horn. May be repeated for credit.—F, W, S. (F, W, S.)

**131N. Applied Study of Music: Advanced (Individual); Trumpet (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Trumpet. May be repeated for credit.—F, W, S. (F, W, S.)

**131O. Applied Study of Music: Advanced (Individual); Trombone (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Trombone. May be repeated for credit.—F, W, S. (F, W, S.)

**131P. Applied Study of Music: Advanced (Individual); Tuba (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Tuba. May be repeated for credit.—F, W, S. (F, W, S.)

**131Q. Applied Study of Music: Advanced (Individual); Percussion (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Percussion. May be repeated for credit.—F, W, S. (F, W, S.)

**131R. Applied Study of Music: Advanced (Individual); Classical Guitar (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Classical Guitar. May be repeated for credit.—F, W, S. (F, W, S.)

**131U. Applied Study of Music: Advanced (Individual); Saxophone (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor. Open to Music majors only; admission by audition. Admission by audition and consent of instructor. Individual instruction in Saxophone. May be repeated for credit.—F, W, S. (F, W, S.)

**132. Singing for Actors (1)**

Performance—1 hour. Prerequisite: consent of instructor. The elements of basic singing techniques, through selected exercises, vocalises, and songs. May be repeated for credit. (P/NP grading only.) GE credit: AH.

**131B. Applied Study of Music: Advanced (Individual); Piano (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Piano. May be repeated for credit.—F, W, S. (F, W, S.)

**131C. Applied Study of Music: Advanced (Individual); Harpsichord (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Harpsichord. May be repeated for credit.—F, W, S. (F, W, S.)

**131D. Applied Study of Music: Advanced (Individual); Organ (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Organ. May be repeated for credit.—F, W, S. (F, W, S.)

**131E. Applied Study of Music: Advanced (Individual); Violin (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Violin. May be repeated for credit.—F, W, S. (F, W, S.)

**131F. Applied Study of Music: Advanced (Individual); Viola (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: open to Music majors only; admission by audition and consent of instructor. Individual instruction in Viola. May be repeated for credit.—F, W, S. (F, W, S.)

**131G. Applied Study of Music: Advanced (Individual); Cello (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Cello. May be repeated for credit.—F, W, S. (F, W, S.)

**131H. Applied Study of Music: Advanced (Individual); Double Bass (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Double Bass. May be repeated for credit.—F, W, S. (F, W, S.)

**131I. Applied Study of Music: Advanced (Individual); Flute (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Flute. May be repeated for credit.—F, W, S. (F, W, S.)

**131J. Applied Study of Music: Advanced (Individual); Oboe (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: admission by audition. Individual instruction in Oboe. May be repeated for credit.—F, W, S. (F, W, S.)

**131K. Applied Study of Music: Advanced (Individual); Clarinet (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Clarinet. May be repeated for credit.—F, W, S. (F, W, S.)

**131L. Applied Study of Music: Advanced (Individual); Bassoon (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Bassoon. May be repeated for credit.—F, W, S. (F, W, S.)

**131M. Applied Study of Music: Advanced (Individual); French Horn (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in French Horn. May be repeated for credit.—F, W, S. (F, W, S.)

**131N. Applied Study of Music: Advanced (Individual); Trumpet (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Trumpet. May be repeated for credit.—F, W, S. (F, W, S.)

**131O. Applied Study of Music: Advanced (Individual); Trombone (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Trombone. May be repeated for credit.—F, W, S. (F, W, S.)

**131P. Applied Study of Music: Advanced (Individual); Tuba (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Tuba. May be repeated for credit.—F, W, S. (F, W, S.)

**131Q. Applied Study of Music: Advanced (Individual); Percussion (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Percussion. May be repeated for credit.—F, W, S. (F, W, S.)

**131R. Applied Study of Music: Advanced (Individual); Classical Guitar (2)**

Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: consent of instructor; admission by audition. Individual instruction in Classical Guitar. May be repeated for credit.—F, W, S. (F, W, S.)

**140. University Jazz Band (2)**

Rehearsal—4 hours. Prerequisite: consent of instructor. Open to students in any major. Rehearsal, study, and performance of jazz band music and full variety of jazz band styles, including swing, be-bop, and contemporary jazz styles. May be repeated for credit. (P/NP grading only.)—F, W, S. (F, W, S.) Griffith

**141. University Symphony (2)**

Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Sight-reading, rehearsal and performance of music from the orchestral literature. May be repeated for credit. (P/NP grading only.) GE credit: AH.—F, W, S. (F, W, S.)

**142. University Chamber Singers (2)**

Rehearsal—3 hours. Prerequisite: admission subject to audition before first class meeting. Rehearsal and performance of works for small choral group. May be repeated for credit. (P/NP grading only.) GE credit: AH.—F, W, S. (F, W, S.)

**143. University Concert Band (2)**

Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Rehearsal and performance of music for band. May be repeated for credit. (P/NP grading only.) GE credit: AH.—F, W, S. (F, W, S.) Nowlen

**144. University Chorus (2)**

Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University. Rehearsal and performance

of choral music. May be repeated for credit. (P/NP grading only.) GE credit: AH.—F, W, S. (F, W, S.) Thomas

**145. Early Music Ensemble (2)**

Rehearsal—4 hours. Prerequisite: consent of instructor; admission by audition. Rehearsal and performance of Medieval, Renaissance, and Baroque music for vocal ensemble and historical instruments. May be repeated for credit. (P/NP grading only.) GE credit: AH.—F, W, S. (F, W, S.)

**146. Chamber Music Ensemble (1)**

Rehearsal—2 hours; student practice—1 hour. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Study, rehearsal, and performance of ensemble music for strings, winds, voice, piano, harpsichord, and organ. May be repeated for credit. (P/NP grading only.) GE credit: AH.—F, W, S. (F, W, S.) Baldini

**147. University Wind Ensemble (2)**

Rehearsal—4 hours. Prerequisite: consent of instructor. Rehearsal, study, and performance of a full variety of wind ensemble music; and to have students share their work in public performances. May be repeated for credit. (P/NP grading only.) GE credit: AH.—F, (F.) Nowlen

**148. Hindustani Vocal Ensemble (2)**

Rehearsal—2 hours. Prerequisite: consent of instructor. Basics of Hindustani music through theory and practice. Fundamentals of raga (mode) and tala (rhythms) with special emphasis on improvisation, a central feature of khyal (singing style). Five ragas each quarter. May be repeated up to six times for credit. (P/NP grading only.) GE credit: AH.—W, S. (W, S.) Sahai

**149. Indonesian Gamelan Ensemble (2)**

Rehearsal—2 hours. Prerequisite: consent of instructor. Indonesian music practice. Basic instrumental technique and repertory. Focus on two styles of Sundanese gamelan (tuned percussion orchestras): salendro and degung. May be repeated for credit. (P/NP grading only.) GE credit: AH.—F, W, S. (F, W, S.) Spiller

**150. Brasilian Samba School (2)**

Rehearsal—2 hours. Prerequisite: consent of instructor. Practice of Brasilian music. Basic instrumental technique and repertory. Focus on the percussion traditions of Rio de Janeiro and Bahia. May be repeated up to six times for credit. (P/NP grading only.) GE credit: ArtHum | AH.—F, W, S. (F, W, S.) Roh

**151. Korean Percussion Ensemble (2)**

Rehearsal—2 hours; listening—2 hours; practice—2 hours. Prerequisite: consent of instructor. Class size limited to 20 students. Practice of Korean percussion styles. Basic instrumental technique and repertory. Focus on the percussion traditions of samulnori and basic concepts of p'ungmul. (P/NP grading only) May be repeated six times for credit. GE credit: AH.—F, W, S. (F, W, S.) Lee

**192. Internship in Music (1-4)**

Internship—3-12 hours. Prerequisite: consent of instructor or academic adviser. Student must submit a written proposal to an appropriate Music Department instructor. Internship outside the university related to music. May be repeated up to eight units of credit. (P/NP grading only.) GE credit: AH.—F, W, S, Su. (F, W, S, Su.)

**194HA. Special Study for Honors Students (2-4)**

Independent study—6-12 hours. Prerequisite: courses 7C and 123. Open only to students who qualify for the honors program and admission to music Senior Honors Program. Preparation and presentation of a culminating project, under the supervision of an instructor, in one of the creative or scholarly areas of music. (Deferred grading only, pending completion of sequence.) GE credit: ArtHum | AH.—F, W, S. (F, W, S.)

### **194HB. Special Study for Honors Students (2-4)**

Independent study—6-12 hours. Prerequisite: completion of course 194HA; consent of instructor. Open only to students who qualify for honors program and admission to Music Senior Honors Program. Preparation and presentation of a culminating project, under the supervision of an instructor, in one of the creative or scholarly areas of music. (Deferred grading only, pending completion of sequence.) GE credit: ArtHum | AH.—F, W, S. (F, W, S.)

### **195. Senior Project (2)**

Project—6 hours. Prerequisite: completion of course 7C and 123; consent of instructor. Preparation of a senior project in music composition (public presentation of a new work), in music performance (a public recital), or in music history and theory (public presentation of research results). GE credit: ArtHum | AH.—F, W, S. (F, W, S.)

### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) GE credit: AH.—F, W, S. (F, W, S.)

### **199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.) GE credit: AH.—F, W, S. (F, W, S.)

## **Graduate**

### **202. Notation (4)**

Seminar—3 hours; term paper. Open to graduate students in music; advanced undergraduates with consent of instructor. Study of musical notation; investigation of techniques for editing Medieval and Renaissance music. Offered in alternate years.—F, W, S. (F, W, S.) Berger

### **203. Music Composition (4)**

Seminar—3 hours; term paper. Open to graduate students in music; advanced undergraduates with consent of instructor. Technical projects that explore compositional problems, the skill and techniques with which to solve them, and free composition. May be repeated for credit.—F, W, S. (F, W, S.) Bauer, Nichols, Ortiz, Pelo, Rohde, San Martin

### **204. Advanced Conducting (3)**

Tutorial—2 hours; practice. Prerequisite: consent of instructor. Open to graduate students in conducting. This course covers the technical aspects of conducting and the broader issues in music history and analysis that conductors must face before leading a rehearsal or performance. May be repeated for credit.—F, W, S. (F, W, S.) Baldini, Thomas

### **207. Advanced Electronic and Computer Music (4)**

Seminar—2 hours. Prerequisite: consent of instructor. Advanced composition of computer and electronic music.

### **210A. Proseminar in Music (Theory and Analysis) (4)**

Seminar—3 hours; term paper. Open to graduate students in music; advanced undergraduates with consent of instructor. Voice-leading analysis of tonal music derived from Schenker and pitchclass set theory. Recent work on compositional design, generalizations of the concept of interval, psychologically oriented music theory, and theories of durational structure and timbre.—W. (W.) San Martin

### **210B. Proseminar in Music (Musicology and Criticism) (4)**

Seminar—3 hours; term paper. Open to graduate students in music; advanced undergraduates with consent of instructor. Issues and concepts of music history, including performance practice questions for specific repertoires and periods; principles, aims, and methods of archival study; historical theory; evolution of musical styles; philosophical debates about goals and aims of the discipline in general.—F. (F.) Owens

### **210C. Proseminar in Music (Ethnomusicology) (4)**

Seminar—3 hours; term paper. Open to graduate students in music; advanced undergraduates with consent of instructor. Introduction to ethnomusicology

through its intellectual history, theoretical approaches, analytical techniques, and methodologies.—S. (S.) Lee

### **212. Ethics of Musical Ethnography (4)**

Seminar—3 hours; fieldwork. Open to graduate students in music. Advanced undergraduates with consent of instructor. The role, methodology, perception, and assumptions of the ethnomusicologist in ethnographic scholarship. Examination of complex ethical and political questions in relation to practical fieldwork techniques. Offered in alternate years.—W. (W.) Lee

### **213. Transcription and Notation (4)**

Seminar—3 hours; project. Prerequisite: Open to graduate students in music. Advanced undergraduates with consent of instructor. Practical instruction in the transcription and analysis of primarily non-Western musics. Analytical and theoretical issues, the politics of representation, and the cultural values and ideologies implicit in notation. Offered in alternate years.—S. (S.) Spiller

### **214. Recent Issues in Ethnomusicology (4)**

Seminar—3 hours; term paper. Open to graduate students in music; advanced undergraduates with consent of instructor. Issues, schools of thought, and basic literature in ethnomusicology from the 1980s to present. Emphasis on theory and methodology. Offered in alternate years.

### **221. Topics in Music History (4)**

Seminar—3 hours. Open to graduate students in music; advanced undergraduates with consent of instructor. Studies in selected areas of music history and theory. May be repeated for credit.—F, W, S. (F, W, S.)

### **222. Techniques of Analysis (4)**

Seminar—3 hours. Open to graduate students in music; advanced undergraduates with consent of instructor. Analysis and analytical techniques as applied to music of all historical style periods. May be repeated for credit.—F, S. (F, S.)

### **223. Topics in Ethnomusicology (4)**

Seminar—4 hours. Prerequisite: open to graduate students in music; advanced undergraduates with consent of instructor. Intended for graduate students in Music; Anthropology students may enroll with consent of instructor. In-depth ethnomusicological studies of selected cultures and their musics; study of historical, theoretical, contextual, and cultural features.—W. (W.)

### **299. Individual Study (1-12)**

(S/U grading only.)

## **Native American Studies**

(College of Letters and Science)

Steven J. Crum, Ph.D., Chairperson of the Department

**Department Office.** 2407 Hart Hall  
530-752-3237; <http://nas.ucdavis.edu>

### **Faculty**

Steven J. Crum, Ph.D., Professor  
Inés Hernandez-Avila, Ph.D., Professor  
*Academic Senate Distinguished Teaching Award*  
Martha J. Macri, Ph.D., Professor  
Liza Grandia, Ph.D., Associate Professor  
Zoila Mendoza, Ph.D., Professor  
Elisabeth Rose Middleton, Ph.D., Assistant Professor  
Jessica B. Pereira, Ph.D., Assistant Professor  
Justin D. Spence, Ph.D., Assistant Professor  
Hulleah Tsinnhahjinne, M.F.A., Associate Professor

### **Emeriti Faculty**

George C. Longfish, M.F.A., Professor Emeritus  
Martha J. Macri, Ph.D., Professor Emeritus  
Victor D. Montejo, Ph.D., Professor Emeritus  
Stefano Varese, Ph.D., Professor Emeritus

## **The Major Program**

Native American Studies provides a multi-disciplinary introduction to the indigenous cultures of North, Central, and South America. It challenges students to consider issues of cultural diversity, sovereignty, and indigenous knowledge systems in preparation for living in a world of constantly increasing social and cultural complexity.

**The Program.** Students electing a major in Native American Studies may complete Plan I, Plan II, or Plan III. Plan I enables students to concentrate chiefly upon the Native experience in North America (north of Mexico). Plan II encourages interested students to focus upon Meso-America with some course work integrating Meso-America with North America and South America. Plan III focuses upon South America with some course work integrating that region with areas to the north.

**Career Alternatives.** Native American Studies is excellent preparation for a scholarly career or professional career such as teaching, law, human services, health, tribal administration, social work, and inter-ethnic relations. Graduate schools and agencies in these and related areas are looking for students with broad interdisciplinary preparation and who possess knowledge and sensitivity relating to ethnic issues and cultural diversity.

### **A.B. Major Requirements:**

	UNITS
<b>Preparatory Subject Matter .....</b>	<b>16-24</b>

Native American Studies 1; 10 or 12..... 8

One or two courses from: Native American Studies 5, 12, 32, 33, 34..... 4-8

One or two courses from: African American and African Studies 12, 52, Anthropology 2, 20, 24, Asian American Studies 1, 2, 4, Chicana/o Studies 10, 21, 23, Comparative Literature 25, Community and Regional Development 2, Environmental Science and Policy 10, History 7A, 7B, 7C 17A, Linguistics 1, Religious Studies 90, Technocultural Studies 2 ..... 4-8

**Depth Subject Matter .....** 24

Native American Studies 130A, 130B or 130C, 157, and 180 or 135..... 12

Three course from: Native American Studies 101, 107, 108, 115, 119, 122, 125, 130A, 130B, 130C, 133A, 133B, 135, 146, 161, 162, 180, 181A, 181B, 181C, 185, 188, 191 ..... 12

Note: If a course is counted for either Plans I, II, or III (below), it cannot also be counted as part of the 24 units of Depth Subject Matter.

### **Areas of Specialization (complete one plan)**

#### **Plan I—North American Emphasis ..... 20**

Native American Studies 107 or 108..... 4

Two courses from: Native American Studies 101, 115, 119, 122, 125, 130A, 130B, 130C, 135, 146, 161, 162, 181A, 181B, 181C, 185, 188, 191 ..... 8

One course from: American Studies 100, Anthropology 103, 136, 172, 173, 175, 176, African American and African Studies 100, 107B, 145B, 152, 153, 163, 172, 176, 181, Asian American Studies 102, 112, 115, 121, Chicana/o Studies 100, 110, Sociology 128, Women's Studies

102, 160, 162, 170, 178F, 180, 182 .... 4

One other upper division Native American Studies course, selected in consultation with adviser ..... 4

#### **Plan II—Mexico-Central America Emphasis ..... 20**

Native American Studies 107, 133 or 133B..... 8

Two courses from: American Studies 100, History 110A, 160, 165, 166A, 166B, African American and African Studies 107A, 180, Anthropology 144, Chicana/o Studies 111, 112, 125S, 130, 135S, 147S, Native American Studies 122, 133A, 184 (Study

Abroad), 185, Political Science 143B, Sociology 158, Spanish 177 ..... 8  
 One course from: Art History 151, Native American Studies 181B, 181C, or, if student's work is specifically focused upon a Meso-American language or topic, from Native American Studies 188, 191 ..... 4

**Plan III—South American Emphasis ..... 20**

Two courses from Native American Studies 107, 110A, 110B, 110C, 110D, 120 (Study Abroad) ..... 8  
 Two courses from: African American and African Studies 107A, 155A, 163, 180, Anthropology 103, 144, 175, History 162, 165, Political Science 143A, Sociology 104, Spanish 170 170S, 171, 171S (Summer Abroad) ..... 8  
 One course from History 163B, 164, 167, Political Science 143A ..... 4

**Total Units for the Major ..... 60-68**

**Major Adviser.** Z. Mendoza

**Major Advising.** All new and prospective Native American Studies majors are encouraged to see the Student Affairs Officer individually, once per year, at minimum.

**Minor Program Requirements:**

The Native American Studies minor provides an interdisciplinary introduction to the Native experience in the Americas through coursework in history, literature, art, performance, languages, values, philosophy, religion, current events, political economy, and environment.

**UNITS**

**Native American Studies ..... 24**

One lower division course in Native American Studies ..... 4  
 Five upper division courses in Native American Studies ..... 20  
*Ethno-History:* Native American Studies 130A, 130B, 130C, or 133B,  
*Philosophy and Values:* Native American Studies 107, 108, 110A, 110B, 110C, 110D, 157, 180.  
*Politics and Current Affairs:* Native American Studies 115, 118, 119, 120, 122, 161, 162, 191.  
*Art and Literature:* Native American Studies 101, 125, 181A, 181B, 181C, 184, 185.  
 One other upper division course selected in consultation with adviser.

**Study Off Campus.** Majors have the option of spending one to three quarters elsewhere in the Americas or on or near a reservation as part of the fulfillment of the Area of Specialization. Each student's plan must be approved by the student's adviser and by the chairperson and may fulfill from 12 to 20 of the 28 units required for the emphasis. The courses or field internship taken elsewhere must be focused upon indigenous peoples or indigenous languages and the institution of study shall be located in an area with substantial indigenous population. Students must have upper division standing and, for Plan I, course 107 or the equivalent should have been completed; for Plan II, courses 107 and 133 should have been completed; and for Plan III, courses 107 and 120 should have been completed prior to departure. Several options may be used for receiving academic credit, including course 195. The department strongly encourages students to participate in the UC Education Abroad Program or Short-Term Programs Abroad.

**Graduate Study.** The Department offers a program of study leading to the M.A. and Ph.D. degrees in Native American Studies, as well as a designated emphasis in Native American Studies for graduate students in approved programs. Further information regarding graduate study may be obtained at the Department office and at Graduate Studies.

**Graduate Advisers.** Elisabeth Rose Middleton

**Courses in Native American Studies (NAS)**

**Lower Division**

**1. Introduction to Native American Studies (4)**

Lecture—3 hours; discussion—1 hour. Introduction to Native American Studies with emphasis upon basic concepts relating to Native American historical and political development. GE credit: SocSci, Div | ACGH, DD, SS, WC, WE.—F, W, S. Crum, Middleton

**5. Introduction to Native American Literature (4)**

Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. Intensive focus on analysis of Native American literary texts, with frequent writing assignments to develop critical thinking and composition skills. GE credit: ArtHum, Div, Wrt | AH, DD, OL, WE.—F, W, S, Su.

**7. Indigenous and Minority Languages (4)**

Lecture—3 hours; discussion—1 hour. Survey of the status of indigenous, immigrant, and other minority languages in the Americas and around the world. Topics include linguistic diversity, language endangerment and revitalization, heritage language maintenance in immigrant communities, and language change due to transcultural interactions. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, DD, WC, WE.—F. (F) Spence

**10. Native American Experience (4)**

Lecture—3 hours; discussion—1 hour. Introduction to the diverse cultures of Native American peoples from North, Central, and South America. Emphasis on Native American voices in the expression of cultural views and in the experience of conflicting values. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, DD, WC, WE.—F, W, S, Su. Hernandez-Avila, Mendoza

**12. Native American/Indigenous Film (4)**

Lecture—3 hours; film viewing; discussion—1 hour. Survey and analysis of the visual colonization of Native American peoples and the contemporary responses by Native American/Indigenous filmmakers claiming visual sovereignty. Examines a range of filmic genres including documentary, features, shorts, festivals, tv and internet screening. GE credit: ArtHum or SocSci | ACGH, AH or SS, DD, VL, WC, WE.—Tsinhnahjinnie

**32. Native American Music and Dance (4)**

Lecture/discussion—4 hours. Introduction to the music and dance of the native peoples of the Americas. Students will study secular native music and dance from a cross-section of regions and tribes. GE credit: Div.—F.

**33. Introduction to Native American Art (4)**

Lecture—4 hours. Introduction to Native American Art from throughout North America, inclusive of traditional forms, techniques and designs in a range of media including ceramics, basketry, fiberwork, carving, painting, sculpture and photography within a context of social and political history. GE credit: ArtHum, Div | ACGH, AH or SS, DD, OL, VL, WE.—F. Tsinhnahjinnie

**34. Native American Art Studio (4)**

Lecture—2 hours; studio—6 hours. Limited enrollment. Studio projects to be influenced by contemporary and traditional Native American arts. Examples of designs and media presented in lectures will be of indigenous origin. Introduction and familiarized with various materials and techniques. GE credit: ArtHum | ACGH, AH, DD, OL, VL, WC.—Tsinhnahjinnie

**46. Orientation to Research in Native American Studies (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: Native American Studies major or minor, or consent of instructor. Limited enrollment. Introduces students to basic research resources pertinent to Native American subjects available in the region, including libraries, archives, museums, etc. Empha-

sis is upon learning to use documentary resources or other collections of data. Students will carry out individual projects. GE credit: SocSci, Div, Wrt.

**98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division**

**101. Contemporary Native American Art (4)**

Lecture—3 hours; extensive writing. Examination of contemporary artworks by selected Native American and Indigenous Master artists, in a wide range of media, including ceramics, metal arts, photography, video, painting, installation and performance within a context of political and social histories. Offered in alternate years. GE credit: ArtHum, Div | ACGH, AH or SS, DD, OL, VL, WE.—Tsinhnahjinnie

**107. Special Topics in Native American Languages (4)**

Lecture/discussion—4 hours. Prerequisite: consent of instructor. Investigation of various subjects in contemporary and historical Native American language studies. May be repeated for credit when a different topic is studied. GE credit: Div.—W, S. Mendoza, Spence

**108. Indigenous Languages of California (4)**

Lecture/discussion—3 hours; term paper. Survey of the indigenous languages of the California region: linguistic prehistory, languages at first European contact, subsequent language loss, current efforts at language and cultural revitalization, indigenous languages of recent immigrants to California. GE credit: ArtHum or SocSci | ACGH, AH or SS, DD, WE.—W. Spence

**110A. Quechua Language and Society, Beginning Level 1 (4)**

Lecture/discussion—4 hours. Not open to students who took course 107 in the Fall quarter of 2007. Introduction to Quechua language and society emphasizing the practical use of the language. Provides the student with some basic Quechua communication skills and with an initial knowledge about contemporary Andean society and the status of Quechua language today. GE credit: SocSci | SS.—Mendoza

**110B. Quechua Language and Society, Beginning Level 2 (4)**

Lecture/discussion—4 hours. Prerequisite: course 110A. Second Level of the teaching of Quechua language and society. Emphasis on development of conversational and reading skills. Continuation of the study of aspects of contemporary Andean society and the status of Quechua language today. Offered in alternate years. GE credit: SocSci | SS.—W. Mendoza

**110C. Quechua Language and Society, Intermediate Level 1 (4)**

Lecture/discussion—4 hours. Prerequisite: courses 110A and B. Third level of the teaching of Quechua language and society. Emphasis on development of conversational and reading skills. Introduction to more complex grammatical structures. Continuing the study of contemporary Andean society and the status of Quechua language today. Offered in alternate years. GE credit: SocSci | SS.—W. Mendoza

**110D. Quechua Language and Society, Intermediate Level 2 (4)**

Lecture/discussion—4 hours. Prerequisite: course 110A, B and C. Fourth level of the teaching of Quechua language and society. Emphasis on complex structural patterns while emphasizing conversational skills and improving reading competence. Study of different sociopolitical processes that have affected Andean identity and the status of Quechua language. Offered in alternate years. GE credit: SocSci | SS.—S. Mendoza

**115. Native Americans in the Contemporary World (4)**

Lecture/discussion—4 hours. Prerequisite: upper division standing or consent of instructor. Important issues facing Native Americans in the contemporary world. Focus primarily on the diverse ways of life, histories and realities of indigenous people throughout the Americas as they develop their own cultural and political institutions. GE credit: ArtHum or SocSci, Div | AH or SS, ACGH, DD, OL, WE.—W. Crum

**116. Native American Traditional Governments (4)**

Lecture—4 hours. Prerequisite: course 1; Anthropology 2. Study of selected Native American Tribal Governments, confederations, leagues, and alliance systems. Offered in alternate years. GE credit: SocSci, Div.

**117. Native American Governmental Decision Making (4)**

Lecture—4 hours. Prerequisite: course 116, Political Science 2; Anthropology 123 recommended. Native American governmental and community decision making with emphasis on federal and state programs, tribal sovereignty, current political trends and funding for tribal services. Offered in alternate years. GE credit: SocSci, Div.

**118. Native American Politics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Examination of the various interest groups and movements found among Native people and how they relate to the determination of Indian affairs. Study of political action available to Native groups, and local communities, along with relevant theory relating to underdevelopment. Offered in alternate years. GE credit: SocSci | ACGH, DD, SS, WC, WE.—Crum

**119. Introduction to Federal Indian Law (4)**

Lecture—3 hours; term paper. Introduction to the foundational cases and statutes of federal Indian law, from European Contact through the 20th century. GE credit: SocSci | ACGH, SS, WE.—S. Middleton

**120. Ethnopolitics of South American Indians (4)**

Lecture/discussion—4 hours. Prerequisite: course 1, 10 or 55. Social, political, cultural movements of indigenous South Americans in response to establishment, expansion of European colonialism, post-colonial nation-states. Ethnopolitical processes developed through interactions between Indians, Euroamericans. Socioethnographic analysis of main indigenous areas and the development of national societies. GE credit: SocSci, Div, Wrt.

**121. Corporate Colonialism (4)**

Lecture/discussion—4 hours. Prerequisite: course 1, 10 or 12 encouraged, but not required. Price of progress and modernity for native and non-native people. History of the corporation and neoliberalism, military and intelligence agencies, debt, Taylorism, education institutions, media, and law. Discussion of alternatives advocated by contemporary and indigenous social movements. GE credit: SocSci | ACGH, DD, SS, WC, WE.—W. (W.) Granda

**122. Native American Community Development (4)**

Lecture—4 hours. Prerequisite: course 1 or 10. Application of community development theory and techniques to the development problems of Native American communities. (Former course 161.) Offered in alternate years. GE credit: ACGH, DD, OL, SS, WE.

**123. Native Foods and Farming of the Americas (4)**

Lecture/discussion—2 hours. Prerequisite: course 7A concurrently; completion of course 16C or demonstrate required proficiency level on diagnostic exam. Crop domestication, agrobiodiversity, and cuisines of the Americas. Cultural and social history of native American foods like maize, potatoes, quinoa, chocolate, peppers, beans, avocados, etc. Discussion of socio-economic, environmental, legal challenges fac-

ing indigenous and peasant farmers today. Offered in alternate years. GE credit: SciEng or SocSci, Wrt | DD, OL, SE or SS, WC.—S. (S.) Grandia

**125. Performance and Culture Among Native Americans (4)**

Lecture—3 hours; film viewing—3 hours. Prerequisite: upper division standing in division of humanities or social sciences or consent of instructor. Interdisciplinary study of public expressive forms among Native Americans. Comparison and analysis of music, dances, rituals, and dramas from throughout North, Central, and South America in their social and cultural contexts. Not open for credit to students who have completed Music 125. Offered in alternate years. GE credit: ArtHum or SocSci | AH or SS, WC, WE.—Mendoza

**130A. Native American Ethno-Historical Development (4)**

Lecture—4 hours. Prerequisite: upper division standing or consent of instructor. Study of Native American ethno-history in North America before 1770s. GE credit: SocSci, Div, Wrt | ACGH, DD, SS, WC, WE.—F. Crum

**130B. Native American Ethno-Historical Development (4)**

Lecture/discussion—4 hours. Prerequisite: upper division standing or consent of instructor. Study of Native American ethno-history in North America, 1770-1890. GE credit: SocSci, Div, Wrt | ACGH, DD, SS, WE.—W. Crum

**130C. Native American Ethno-Historical Development (4)**

Lecture/discussion—4 hours. Prerequisite: upper division standing or consent of instructor. Study of Native American ethno-history in North America after 1890. GE credit: SocSci, Div, Wrt | ACGH, DD, SS, WE.—S. Crum

**133. Ethnohistory of Native People of Mexico and Central America (4)**

Lecture/discussion—4 hours. Prerequisite: course 1, 10 or 55. Ethnohistorical development of pre-colonial, colonial, post-colonial Mexican and Central American indigenous people; the impact of economic and political factors on the process of cultural adaptation. Attention is given to the questions of nation-building, forced assimilation, indigenous resistance, organized political responses. GE credit: SocSci, Div.

**133A. Ethnohistory of Native Peoples of Mexico and Central America to 1500 (4)**

Lecture/discussion—4 hours; term paper. Prerequisite: course 1 or course 10 or consent of instructor. Ethnohistorical development of the indigenous peoples of Mexico and Central America up to and including the earliest period of European contact. Focus is on indigenous written historical records of the Maya, Mixtec, and Nahuaatl peoples. May be repeated one time for credit. This course can be repeated provided the student chooses a new topic for the term paper/project and for the PowerPoint presentations. The material is so extensive that more than one exposure to it can be very beneficial to students wanting to focus on ancient Mesoamerica. GE credit: ArtHum or SocSci, Div | AH or SS, VL, WC, WE.—S.

**133B. Ethnohistory of Native Peoples of Mexico and Central America 1500 to 2000 (4)**

Lecture/discussion—4 hours; term paper. Prerequisite: course 1 or 10, or consent of instructor. Ethnohistory of indigenous peoples of Mexico and Central America from 1500 to contemporary times. Focus on social and cultural dynamics, particularly the role of indigenous people in the process of nation-state building in Mexico and Central America. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH, OL, SS, WE.

**134. Race, Culture, and Nation (4)**

Lecture—4 hours. Prerequisite: upper division standing or consent of instructor. Exploration of complexities of Native American racial, cultural and national identities and alliances. Study of tribal and federal citizenship, mixed descent and diasporic people(s),

claims to resources, ethnic fraud and contemporary movements of cultural resurgence and political sovereignty and self-determination. Offered in alternate years. GE credit: SocSci | ACGH, DD, SS, WE.—W. (W.) Perea

**135. Gender Construction in Native Societies (4)**

Lecture—4 hours. Prerequisite: upper division standing or consent of instructor. Historical and traditional Native American constructions of feminine and masculine genders as well as third, fourth, and fifth genders. Examines gender roles and statuses. Addresses the problems with contemporary terminologies and impacts of colonization on contemporary constructions of gender identities. Offered in alternate years. GE credit: ArtHum or SocSci | AH or SS, DD, OL, WE.—Perea

**146. Orientation to Research in Native American Studies (4)**

Lecture/discussion—4 hours; term paper. Prerequisite: Native American Studies major or minor, or consent of instructor. Limited enrollment. Introduction to basic research resources pertinent to Native American subjects available in the region, including libraries, archives, museums, etc. Emphasis on learning to use documentary resources or other collections of data. Students will carry out individual projects. GE credit: SocSci | ACGH, DD, SS, WE.—W. Crum

**157. Native American Religion and Philosophy (4)**

Lecture/discussion—4 hours. Religious and philosophical traditions of Native American/indigenous peoples of the Americas. Offered in alternate years. GE credit: ArtHum, Div | AH, OL, WE.—Hernández-Avila

**161. California Indian Environmental Policy I (4)**

Lecture/discussion—4 hours; term paper. Prerequisite: course 1 or course 10 or consent of instructor. Contemporary California Indian environmental policy issues, with a focus on water, minerals, contamination, and alliance-building. Issues will be placed within historical and political context, drawing on theories of Native environmental ethics, environmental justice, and Federal Indian law. Offered in alternate years. GE credit: ACGH, DD, SS, WE.—Middleton

**162. California Indian Environmental Policy II (4)**

Lecture/discussion—4 hours; term paper. Contemporary California Indian environmental policy issues, with a focus on planning, site protection, and collaborative structures. Issues will be placed within historical and political context, drawing on theories of Native environmental ethics, environmental justice, and Federal Indian law. Offered in alternate years. GE credit: SocSci | ACGH, DD, SS, WE.—Middleton

**180. Native American Women (4)**

Lecture/discussion—4 hours. Prerequisite: course 1, 10, or Women's Studies 50. Native American women's life experiences, cross-cultural comparisons of gender roles, and Native women's contemporary feminist thought. Utilizes texts from literature, social science, and autobiography/biography. GE credit: ArtHum or SocSci | AH or SS, DD, OL, WE.—W.

**181A. Native American Literature (4)**

Lecture/discussion—4 hours. Prerequisite: one from course 5, English 3, Comparative Literature 1, 2, 3. Works of fiction (short story, novel) by contemporary Native American authors, with an emphasis on writers from the United States. Offered in alternate years. GE credit: ArtHum, Div, Wrt | ACGH, AH, DD, OL, WE.—Hernández-Avila

**181B. Native American Literature (4)**

Lecture/discussion—4 hours. Prerequisite: one from course 5, English 3, Comparative Literature 1, 2, 3. Works by or about Native Americans including non-fiction novels, biographies and autobiographies. Explore ways Native Americans create and recreate their culture through the creative process in literature. Examine from a critical perspective autobiographies

and testimonial literature. Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, DD, OL, WE.—Hernández-Avila

### **181C. Contemporary Native American Poetry (4)**

Lecture—4 hours. Works of poetry by contemporary Native American/indigenous poets, with some attention to traditional cultural poetic expressions. GE credit: ArtHum, Div, Wrt | AH, DD, OL, WE.—F, W, S. Hernández-Avila

### **184. Contemporary Indigenous Literature of Mexico (4)**

Lecture/discussion—4 hours. Prerequisite: course 1 or 10; course 181A or 181C recommended; reading knowledge of Spanish required. Contemporary indigenous literature of Mexico, with a focus on the genres (poetry, fiction, drama, essay); analysis of cultural, historical, and spiritual themes, imagery, styles and performances; biographies of and influences on the Native writers themselves. Offered irregularly. GE credit: ArtHum or SocSci | AH or SS, OL, WC.—Su. Hernández-Avila

### **185. Native American Literature in Performance (4)**

Performance instruction—4 hours. Prerequisite: consent of instructor. Performance of contemporary Native American literature onstage, through adaptations of selected literature as well as the creation of original pieces. May be repeated up to four units for credit. Offered in alternate years. GE credit: ArtHum or SocSci | AH, DD, OL, WC.—Hernández-Avila

### **188. Special Topics in Native American Literary Studies (4)**

Lecture/discussion—4 hours; term paper. Prerequisite: upper division standing and one of the following recommended: course 5, 10, 181A, 181C. Special topics drawn from Native American literature. May be repeated for credit when topic differs. Offered irregularly. GE credit: ArtHum, Div, Wrt | AH, DD, OL, WE.—S, Su. Hernández-Avila

### **190. Seminar in Native American Studies (2)**

Discussion—2 hours. Prerequisite: senior standing. Seminar of critical issues faced by Native American people. (P/NP grading only.)

### **191. Topics in Native American Studies (4)**

Lecture/discussion—4 hours. Prerequisite: upper division standing. Selected topics in Native American Studies related to indigenous knowledges and worldviews from a historical, cultural, hemispheric perspective. May be repeated for credit when topic differs and/or when offered by a different instructor. Offered irregularly. GE credit: ArtHum or SocSci. Div | AH or SS, DD, OL, WE.—F, W, S. Hernandez-Avila

### **192. Internship (1-12)**

Internship—1 hour. Prerequisite: enrollment dependent on availability of intern position in Native American Studies or the CN Gorman Museum, with priority to Native American Studies minors/majors; consent of instructor. Restricted to upper division standing. Supervised internship in the CN Gorman Museum, community, and institutional settings related to Native American concerns. May be repeated up to 12 units for credit including 192 and other internships taken in other departments and institutions. (P/NP grading only.) GE credit: ArtHum | AH.—F, W, S, Su. Tsinhnahjinnie

### **194HA. Special Studies for Honors Students (4)**

Independent study—12 hours. Prerequisite: senior qualifying for honors. Directed reading, research and writing culminating in the completion of a senior honors thesis or project under direction of faculty adviser. (Deferred grading only, pending completion of sequence.)

### **194HB. Special Studies for Honors Students (4)**

Independent study—12 hours. Prerequisite: senior qualifying for honors. Directed reading, research and writing culminating in the completion of a senior

honors thesis or project under direction of faculty adviser. (Deferred grading only, pending completion of sequence.)

### **195. Field Experience in Native American Studies (12)**

Field work—36 hours. Prerequisite: senior standing and major in Native American Studies, completion of lower division major requirements, and course 161. Field work with governmental and community groups, under supervision of faculty adviser and sponsor. Knowledge acquired in other courses to be applied in field work. (P/NP grading only.)—F, W, S.

### **196. Senior Project in Native American Studies (4)**

Discussion—1 hour; independent study—3 hours. Prerequisite: senior standing and major in Native American Studies, course 195 (may be taken concurrently), and consent of instructor. Guided research project that enables student to apply the theory and research principles from major course work. Final product is to be a major senior project or thesis. (P/NP grading only.)—F, W, S.

### **197TC. Community Tutoring in Native American Studies (1-5)**

Tutorial—3-15 hours. Prerequisite: consent of major committee; upper division standing with major in Native American Studies. Supervise tutoring in community. (P/NP grading only.)—F, W, S.

### **198. Directed Group Study (1-5)**

Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

## **Graduate**

### **200. Basic Concepts in Native American Studies (4)**

Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Analysis of the characteristics of the discipline of Native American Studies. Concentration is on both traditional and contemporary native scholarship and thought as well as the theoretical and methodological consequences derived from application of these ideas. Offered in alternate years.—Crum, Hernández-Avila, Middleton

### **202. Advanced Topics in Native American Studies (4)**

Seminar—4 hours. Prerequisite: graduate standing. Advanced study of selected topics or themes relevant to the field of Native American studies. Topics will be announced at the time of offering. May be repeated for credit when topic differs.—W, S. Hernández-Avila, Perea

### **207. Leadership Skills and Strategies in California Language Documentation & Revitalization (4)**

Seminar—3 hours; term paper. Introduction to the indigenous languages of the Americas, with a focus on California; an examination of how contemporary Native communities document and revitalize their heritage languages. Learn to assist and administer language programs.—S. Spence

### **212. Community Development for Sovereignty and Autonomy (4)**

Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Examines a sample of contemporary indigenous communities from south, central and north America with the goal of understanding and evaluating the strategies adopted by Native American communities to develop and implement forms of sovereignty or autonomous self-management. Offered in alternate years.—Grandia

### **213. Native Criminality and Deviance (4)**

Seminar—4 hours. Prerequisite: graduate standing. Examination of “deviance” in Native communities with focus on Native criminality in North America. Analysis of the concept of deviance from several dif-

ferent world views. Readings from a range of theories to incorporate varying theoretical perspective on criminality and deviance.

### **217. Public Law 83-280: Colonial Termination (4)**

Seminar—4 hours. Prerequisite: graduate standing, including school of law students. Examination of the signature law of the Termination Era, Public Law 83-280. Discussions to include termination, societal conformity, political consent, jurisdiction, self-determination & decolonization, and colonial relationship between Native Peoples and the United States.—F, W, S. Crum

### **220. Colonialism, Neoliberalism, and Indigenous Self-Determination (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. History, political economy and legacies of imperial/colonial systems. Continuities and discontinuities with corporate globalization and neoliberalism. Focus on resistance and self-determination of indigenous peoples, but with comparison to other groups. Offered in alternate years.—Grandia

### **224. Performance in the Americas (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Ethnomusicological and anthropological approaches to study of public performance in the Americas. New ways of looking at music, dance, rituals and other forms of public expressive forms normally called “folklore” or “popular culture.” Not open for credit to students who have completed Music 224. (Former course Music 224).—Mendoza

### **233. Visual Sovereignty (4)**

Seminar—3 hours; film viewing—2 hours; term paper. Extensively examine the field of contemporary Native American and Indigenous photography, film and performance through research of artworks, writings by artists, theorists, and material in museum collections. May be repeated two times for credit when topic differs. Offered in alternate years.—Tsinhnahjinnie

### **237. Native American Art Collections and Museums (4)**

Seminar—3 hours; term paper. Research and examination of regional Native American art held in museums and other public institutions, as well as privately-held collections. Includes onsite viewing and research of museum collections and archives. Offered in alternate years.—Tsinhnahjinnie

### **240. Native American Public Health: Topics and Issues (4)**

Seminar—3 hours; term paper. Introduction to Native American public health issues and contributing causal factors (including environmental justice and historical trauma); the dimensions of cultural competency in diagnosis and service provision; the structure of Native health care institutions; and debates in Native treatment modalities.—W. Middleton

### **246. Native American/Indigenous Research Methodologies (4)**

Seminar—3 hours; term paper. Introduction to advanced methodologies currently influencing research in Native American Studies and amongst Indigenous communities. Students will develop an original project and course assignments will guide them through the process of research design and implementation. Offered in alternate years.—W. (W) Perea

### **250. Indigenous Critique of Classic Maya Ethnographies (4)**

Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Construction of the Maya world through ethnographic writing during the present century. Deconstruction of ethnographies about the Mayans considering the modern theories and social/anthropological critiques of modern ethnographies. Offered in alternate years.

### **280. Ethnohistorical Theory and Method (4)**

Seminar—3 hours; term paper. Discussion of the ethnohistorical method; the utilization of diverse types of data, especially documentary sources, to reconstruct socio-cultural history. Particular attention to the

applied area of ethnohistory in the solution of contemporary social problems. Offered in alternate years.—Crum

### **298. Group Study for Graduate Students (1-5)**

Prerequisite: graduate standing, consent of instructor. (S/U grading only.)

### **299. Special Study for Graduate Students (1-12)**

Prerequisite: graduate standing, consent of instructor. (S/U grading only.)

### **Professional**

#### **396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S.

## **Natural Sciences**

See **Earth and Planetary Sciences**, on page 237.

## **Nematology**

Please see the department of **Entomology and Nematology**, on page 320, for further information.

(College of Agricultural and Environmental Sciences)

Steve Nadler, Ph.D., Chairperson of the Department

Joanna Chiu, Ph.D., Vice Chairperson of the Department

**Department Office.** 367 Briggs; 530-752-0300

### **Faculty**

Edward P. Caswell-Chen, Ph.D., Professor

Edwin E. Lewis, Professor

Steven A. Nadler, Ph.D., Professor

Becky B. Westerdahl, Ph.D., Professor

### **Emeriti Faculty**

Howard Ferris, Ph.D., Professor Emeritus

Bruce A. Jaffee, Ph.D., Professor Emeritus

Harry K. Kaya, Ph.D., Professor Emeritus

(*Entomology*)

### **Minor Program Requirements:**

UNITS

#### **Nematology ..... 18-20**

Nematology 100, 110, and Soil Science 100 ..... 10

Two or three courses from one of the following areas: ..... 8-10

- (a) *Plant Science*: Microbiology 102; Entomology 100, 135, 153, 156, 156L; Evolution and Ecology 112; Plant Pathology 120, 148; Plant Biology 121; Soil Science 111, 112
- (b) *Entomology*: One upper division Entomology course; Evolution and Ecology 112; Microbiology 102; Plant Biology 121; Plant Pathology 120, 148; Soil Science 102, 111, 112

**Minor Adviser.** S. Nadler

**Graduate Study.** Graduate degrees specializing in Nematology are offered through the Departments of Entomology and Plant Pathology, and through various Graduate Groups (Biochemistry, Ecology, Genetics, Plant Protection and Pest Management). Refer also to the Graduate Studies chapter of this catalog.

### **Courses in Nematology (NEM)**

**Related Courses.** See **Entomology and Nematology**, on page 320.

### **Lower Division**

#### **10V. General Biology (4)**

Web virtual lecture—3 hours; web electronic discussion—1 hour. Concepts and issues in biology. Emphasis on composition and structure of organisms; regulation and signaling; heredity, evolution and the interaction and interdependence among life forms and their environments. Significant writing is required. Designed for students not specializing in biology. Not open for credit to students who have completed course Biological Sciences 1A, 1B, 1C, 2A, 2B, 2C, 10 or 10V. GE credit: SciEng, Wrt | SE, SL, WE.—S. (S.) Westerdahl

### **Upper Division**

#### **100. General Plant Nematology (4)**

Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1B or 10. An introduction to the classification, morphology, biology, and control of the nematodes attacking cultivated crops. GE credit: SciEng | SE.—F. (F.)

#### **110. Introduction to Nematology (2)**

Lecture—2 hours. Prerequisite: Biological Sciences 1B or the equivalent or consent of instructor. The relationship of nematodes to human environment. Classification, morphology, ecology, distribution, and importance of nematodes occurring in water and soil as parasites of plants and animals. GE credit: SciEng | SE.—W. (W.) Caswell-Chen, Nadler

#### **150. Revising Scientific Prose (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: one course in English composition; understanding of English grammar and parts of speech; upper division standing in a science major; or consent of the instructor. Class size limited to 15 students. Principles of detailed revision; close analysis of writing styles in research papers, popular scientific articles, and other scientific reports; use of verb-based and noun-based writing styles. GE credit: Wrt.—W. (W.) Jaffee

#### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

### **Graduate**

#### **201. Molecular and Physiological Plant Nematology (2)**

Lecture—1 hour; discussion—1 hour. Prerequisite: Biological Sciences 101; Plant Pathology 120, course 100 or 110. Molecular biology and physiology of nematodes using *Caenorhabditis elegans* as a model, but with emphasis on plant-parasitic species. Plant responses to nematodes. Discussion of current literature emphasized. Offered in alternate years.—W.

#### **203. Ecology of Parasitic Nematodes (2)**

Lecture—1 hour; discussion—1 hour. Prerequisite: course 100 or 110 or Entomology 156; Evolution and Ecology 101 or Plant Biology 117. Major concepts in population and community ecology of animal- and plant-parasitic nematodes. Current advances in techniques, theory, and basic information about nematode-host dynamics, and application to management of nematode diseases. Offered in alternate years.—(S.) Caswell-Chen

#### **204. Management of Plant-Parasitic Nematodes (2)**

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 100 or 110. Theory, foundation, principles and practices of nematode management. Techniques and equipment used to manage nematodes and methods used to analyze their effectiveness. Offered in alternate years.—S. Westerdahl

#### **205. Insect Nematology and Biological Control (2)**

Lecture—1 hour; discussion—1 hour. Prerequisite: courses 100 and 110, Entomology 100 or 110. The biology of insect-parasitic nematodes, their effect on the host, and their potential as biological control agents of insect and other invertebrate pests. Appli-

cation of ecological theory in classical and augmented biological control. Offered in alternate years.—(F.) Lewis

#### **206. Nematode Systematics and Evolution (2)**

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 100 or 110 or Entomology 156; Evolution and Ecology 100 recommended. Nematode diversity as revealed by morphological and molecular evidence. Laboratory experience focuses on structural features used in taxonomy. Phylogenetic relationships based on morphological and molecular data used to consider patterns of character change among taxa. Offered in alternate years.—(F.) Nadler

#### **210. Molecular Phylogenetic Analysis (3)**

Lecture—2 hours; laboratory—3 hours. Theory and practice of inferring phylogenetic trees using molecular sequence data. Practical techniques for obtaining sequence data, advantages and disadvantages of common approaches for inferring trees, statistical methods for comparing alternative hypotheses. (Same course as Evolution and Ecology 210.) Offered in alternate years.—(F.) Nadler

#### **245. Field Nematology (1)**

Fieldwork—6 days. Prerequisite: course 100. Six-day demonstration and field study in applied nematology including diagnosis and prediction of nematode field problem strategies for control field plot design, and establishment in association with diverse California crops. (S/U grading only.)—F. (F.)

#### **290. Seminar (1)**

Seminar—1 hour. (S/U grading only.)—F, S. (F, S.)

#### **290C. Advanced Research Conference (1)**

Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Planning and results of research programs, proposals, and experiments. Discussion and critical evaluation of original research being conducted by the group. Discussion led by individual research instructors for research group. (S/U grading only.)

#### **298. Group Study (1-5)**

(S/U grading only.)

#### **299. Research (1-12)**

(S/U grading only.)

## **Neurobiology, Physiology, and Behavior**

(College of Biological Sciences)

W. Martin Usrey, Ph.D., Chairperson of the Department

**Department Office.** 196 Briggs Hall  
530-752-0203; <http://www.npb.ucdavis.edu>

### **Faculty**

#### **Primary Department Members**

Keith Baar, Ph.D., Associate Professor  
(*Physiology & Membrane Biology*)

Sue C. Bodine, Ph.D., Professor  
(*Physiology & Membrane Biology*)

Kenneth H. Britten, Ph.D., Professor  
Rebecca M. Calisi, Ph.D., Assistant Professor  
Natalia Caporale, Ph.D., Lecturer with Potential for Security of Employment

Earl E. Carstens, Ph.D., Distinguished Professor  
(*Anesthesiology & Pain Medicine*)

Hwai-Jong Cheng, M.D., Ph.D., Professor  
(*Pathology & Laboratory Medicine*)

Stacey Combes, Ph.D., Assistant Professor

Thomas P. Coombs-Hahn, Ph.D., Professor

William DeBello, Ph.D., Associate Professor

Jochen Ditterich, Ph.D., Associate Professor

Diasynou Fioravante, Ph.D., Assistant Professor

Charles A. Fuller, Ph.D., Professor

John D. Furlow, Ph.D., Professor

Mark S. Goldman, Ph.D., Professor  
(*Ophthalmology & Vision Science*)

Aldrin V. Gomes, Ph.D., Associate Professor (*Physiology & Membrane Biology*)  
 David A. Hawkins, Ph.D., Professor  
 Barbara A. Horwitz, Ph.D., Distinguished Professor (*Physiology & Membrane Biology*) Academic Senate Distinguished Teaching Award, UC Davis Prize for Teaching and Scholarly Achievement  
 Mark O. Huising, Ph.D., Assistant Professor  
 Andrew T. Ishida, Ph.D., Professor (*Ophthalmology & Vision Science*)  
 Kim McAllister, Ph.D., Professor (*Neurology*)  
 Lee Miller, Ph.D., Associate Professor  
 Gabrielle A. Nevitt, Ph.D., Professor  
 Alexander S. Nord, Ph.D., Assistant Professor (*Psychiatry & Behavioral Sciences*)  
 Gregg H. Recanzone, Ph.D., Professor  
 Karen K. Ryan, Ph.D., Assistant Professor (*Physiology & Membrane Biology*)  
 Mitchell L. Sutter, Ph.D., Professor  
 James S. Trimmer, Ph.D., Professor (*Physiology & Membrane Biology*)  
 W. Martin Usrey, Ph.D., Professor (*Neurology*)  
 Craig H. Warden, Ph.D., Professor (*Pediatrics*)  
 John S. Werner, Ph.D., Distinguished Professor (*Ophthalmology & Vision Science*)  
 John C. Wingfield, Ph.D., Endowed Chair Physiology, Distinguished Professor  
 Karen M. Zito, Ph.D., Associate Professor

## Emeriti Faculty

William C. Adams, Ph.D., Professor Emeritus  
 Marylyn S. Barkley, Ph.D., M.D., Associate Professor Emerita  
 Edmund M. Bernauer, Ph.D., Professor Emeritus  
 James M. Boda, Ph.D., Professor Emeritus  
 Leo M. Chalupa, Ph.D., Distinguished Professor Emeritus (*Ophthalmology & Vision Science*)  
 Ernest Chang, Ph.D., Professor Emeritus (*Animal Science*)  
 Jack M. Goldberg, Ph.D., Senior Lecturer Emeritus  
 Robert G. Holly, Ph.D., Senior Lecturer Emeritus  
 John M. Horowitz, Ph.D., Professor Emeritus Academic Senate Distinguished Teaching Award  
 Williard S. Lotter, Ph.D., Senior Lecturer Emeritus  
 Verne E. Mendel, Ph.D., Professor Emeritus  
 Alexander I. Mogilner, Ph.D., Professor Emeritus (*Mathematics*)  
 Brian C. Mulloney, Ph.D., Distinguished Professor Emeritus  
 Pamela A. Pappone, Ph.D., Professor, Emerita  
 E. Dean Ryan, Ed.D., Professor Emeritus  
 W. Jeff Weidner, Ph.D., Professor Emeritus  
 Keith R. Williams, Ph.D., Senior Lecturer Emeritus  
 Martin C. Wilson, Ph.D., Professor Emeritus  
 Dorothy E. Woolley, Ph.D., Professor Emerita

## Affiliated Faculty

Erwin A. Bautista, Ph.D., Lecturer  
 Gretchen Casazza, Ph.D., Assistant Adjunct Professor (*Sports Medicine Program*)  
 Ann V. Hedrick, Ph.D., Adjunct Professor  
 Lauren C. Liets, Ph.D., Lecturer  
 Paul B. Salitsky, Ph.D., Lecturer  
 James D. Shaffrazi, M.D., Lecturer  
 Marilyn Ramenofsky, Ph.D., Adjunct Professor  
 Grace L. Rosenquist, Ph.D., Assistant Adjunct Professor

## The Neurobiology, Physiology, and Behavior Major Program

Neurobiology, Physiology, and Behavior is a major that emphasizes the understanding of vital functions common to all animals. All animals perform certain basic functions—they grow, reproduce, move, respond to stimuli, and maintain homeostasis. The physiological mechanisms upon which these functions depend are precisely regulated and highly integrated. Actions of the nervous and endocrine systems determine behavior and the interaction between organisms and their physical and social environments. Students in this major study functional mechanisms; the control, regulation, and integration of these mechanisms; and the behavior that relates to those mechanisms. They do so at the level of the cell, the organ system, and the organism.

**The Program.** In the freshman and sophomore years, students majoring in Neurobiology, Physiology, and Behavior build a broad scientific background, taking courses in chemistry, biology, physics, and mathematics. As juniors or seniors, students can enroll in a variety of Neurobiology, Physiology, and Behavior courses and related upper division courses. The NPB major contains three tracks: the Neurobiology track, the Physiology track, and the Organism-Environmental Interactions track. If you wish to propose an alternative to these tracks for yourself, please meet with your master adviser who can approve such individualized plans. Students can also participate in a number of advanced laboratory courses or may design an individual, independent project guided by a member of the faculty.

**Career Alternatives.** Completion of the Neurobiology, Physiology, and Behavior major provides the foundation for advanced study leading to careers in high school teaching, college level teaching or research. It also serves as the basis for further training in the health professions, including but not limited to human and veterinary medicine, medical technology, physical therapy, pharmacy, nursing, dentistry and optometry. The major is also appropriate for those intending to seek careers in biotechnology or other biologically related industries.

## B.S. Major Requirements:

	UNITS
<b>Preparatory Subject Matter.....</b>	<b>56-66</b>
Biological Sciences 2A-2B-2C .....	15
Chemistry 2A-2B-2C .....	15
Chemistry 8A-8B or 118A-118B-118C .....	6-12
Mathematics 17A-17B-17C or 21A-21B (21C recommended) .....	8-12
Physics 7A-7B-7C .....	12

## Depth Subject Matter ..... 44-49

Biological Sciences 101, 105 (or 102+103), 7-10	
Neurobiology, Physiology, and Behavior 110A-110B-110C .....	15
Three units of laboratory course work from the following track-specific list shown below:.... 3	
<i>Neurobiology track:</i> Neurobiology, Physiology, and Behavior 100L	
<i>Physiology track:</i> Neurobiology, Physiology, and Behavior 101L	
<i>Organism-Environmental Interactions track:</i> Neurobiology, Physiology, and Behavior 101L	
Statistics 100 .....	4
Additional Neurobiology, Physiology, and Behavior track-specific depth unit requirement from the following list:..... 12	
<i>Neurobiology track:</i> Neurobiology, Physiology, and Behavior 124/Psychology 124; Neurobiology, Physiology, and Behavior 160/Neuroscience 160;	
<i>Physiology track:</i> Neurobiology, Physiology, and Behavior 100Q, 101L, 106, 107, 112, 161, 162, 163, 164, 165, 166, 167, 168, 169; Psychology 130, 135, 137	
<i>Physiology track: Animal Science</i> 123; Exercise Biology 106/Cell Biology and Human Anatomy 101; Exercise Biology 106L/Cell Biology and Human Anatomy 101; Exercise Biology 101, 103, 104L, 110, 124; Medical Microbiology and Immunology 188; Pathology, Microbiology and Immunology 126, 126L; Molecular and Cellular Biology 150; Neurobiology, Physiology, and Behavior 123/Anatomy, Physiology, and Cell Biology 100;	
<i>Neurobiology, Physiology, and Behavior</i> 152/Psychology 123; Neurobiology, Physiology, and Behavior 106, 107, 111L, 113, 114, 121, 121L, 128, 130, 132, 139, 140, 141, 141P, 142	
<i>Organism-Environmental Interactions track:</i> Animal Science 104, 106, 123; Evolution and Ecology 105, 106, 107, 110, 147; Neurobiology, Physiology, and Behavior	

123/Anatomy Physiology, and Cell Biology 100; Neurobiology, Physiology, and Behavior 150/Psychology 122; Neurobiology, Physiology, and Behavior 152/Psychology 123; Neurobiology, Physiology, and Behavior 100L, 102, 106, 111L, 117, 126, 128, 132, 140, 141, 141P, 142, 159, 162; Wildlife, Fish, and Conservation Biology 130, 141, 153 One additional Neurobiology, Physiology, and Behavior depth unit requirement or Biological Sciences 104..... 3-5

All other Neurobiology, Physiology, and Behavior courses not used in satisfaction of any other requirement; or Anthropology 154A, 154C; or Entomology 104; or Exercise Biology 101, 102, 111. Courses 192, 197T, 199 may not be used to satisfy the depth unit requirement.

**Total Units for Major ..... 100-115**

## Minor Program Requirements:

UNITS

## Exercise Biology..... 18

At least 15 upper division units in exercise biology from the following courses: Exercise Biology 101, 102, 103, 110, 111, 112, 113, 115, 117, 124, 126..... 15  
 Exercise Biology or other approved course: An additional three upper division units from either the previous list of Exercise Biology courses OR the following courses: Exercise Biology 106; Neurobiology, Physiology, and Behavior 101; Biological Sciences, 101, 104, 105..... 3

**Master Adviser.** Paul Salitsky for the Exercise Biology Major and Exercise Biology Minor

## Human Physiology ..... 20

Exercise Biology 101 ..... 4  
 Neurobiology, Physiology, & Behavior 101 ..... 5  
 One course from: Exercise Biology 102, 110, 111, 113, 116, 117, 125  
 One course from: Neurobiology, Physiology, & Behavior 112, 113, 114, 122, 130, 132, 168  
 One course from: two of the following areas:  
   *Functional Anatomy: Cell Biology and Human Anatomy* 101; *Anthropology* 156  
   *Genetics And Development: Anthropology* 153; *Human Development* 100C, 101, 117; *Molecular and Cellular Biology* 162  
   *Immunology: Medical Microbiology* 188  
   *Nutrition: Nutrition* 111B

## Neuroscience ..... 18

Neurobiology, Physiology, & Behavior 100..... 4

Choose a minimum of 14 units from the following:

Neurobiology, Physiology, & Behavior 100L, 107, 112, 124, 126, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169  
 One of the following may be completed to reach the unit requirement:  
 Psychology 113, 121, 135, 137;  
 Linguistics 175; Philosophy 103; Human Development 163  
 The following courses are cross-listed and either offering can be used to fulfill the course requirement: Neurobiology, Physiology, & Behavior 124/Psychology 124, Neurobiology, Physiology, & Behavior 160/Neuroscience 160

**Master Adviser.** Dr. Hwai-Jong Cheng, M.D., Ph.D.

**Advising Center.** Biology Academic Success Center (BASC); 1023 Sciences Laboratory Building; 530-752-0410; <http://basc.ucdavis.edu/>

**Graduate Study.** Information on graduate study in neuroscience, physiology or behavior may be obtained by writing the Graduate Adviser, College of Biological Sciences, Graduate Academic Pro-

grams. See also the graduate course offerings listed under *Animal Behavior* (A Graduate Group), on page 159; *Molecular, Cellular, and Integrative Physiology* (A Graduate Group), on page 466; *Neuroscience*, on page 484 and *Physiology*, on page 509. See also *Graduate Studies*, on page 120.

## Courses in Exercise Biology (EXB)

### Lower Division

#### 10. Exercise and Fitness: Principles and Practice (3)

Lecture—3 hours. Human movement from physiological, psychological, sociological, and historical perspectives. Biology and psychology of exercise across the human lifespan. Not open for credit to students who have completed an upper division Exercise Biology course. GE credit: SciEng, Div | SE, SL—W. (W.) Barr, Salitsky, Shaffrath

#### 90C. Research Conference (1)

Discussion—1 hour. Prerequisite: lower division standing in Exercise Biology or related biological science and consent of instructor; concurrent enrollment in course 99. Research findings and methods in exercise biology. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

#### 90X. Lower Division Seminar (1-2)

Lecture—1-2 hours. Prerequisite: lower division standing and consent of instructor. Gives freshman or sophomore level students the opportunity to study a special topic in the general area of Exercise Biology in a small class setting. GE credit: SciEng | SE.

#### 92. Exercise Biology Internship (1-5)

Internship—3-15 hours. Prerequisite: consent of instructor, dependent on availability of intern positions. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under department faculty supervision. May be repeated one time for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

#### 97T. Tutoring in Exercise Biology (1-5)

Tutorial—3-15 hours. Prerequisite: lower division standing and consent of instructor. Assisting the professor by tutoring students in exercise biology course-related projects. May be repeated for credit for 10 units including courses 97TC, 197T and 197TC. No tutorial units will be counted towards the Exercise Biology major. (P/NP grading only.)—F, W, S. (F, W, S.)

#### 97TC. Tutoring Exercise Biology in the Community (1-5)

Tutorial—3-15 hours. Prerequisite: consent of instructor and chairperson. Tutoring in the community in exercise biology related projects under the guidance of the faculty. May be repeated one time for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

#### 98. Directed Group Study

Prerequisite: consent of instructor and chairperson. (P/NP grading only.)—F, W, S. (F, W, S.)

#### 99. Special Study for Undergraduates (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S. (F, W, S.)

### Upper Division

#### 101. Exercise Physiology (4)

Lecture—4 hours. Prerequisite: Neurobiology, Physiology, and Behavior 101. Physiologic responses to acute exercise, and physiologic adaptations to both chronic exercise (training) and selected environmental stresses. Emphasis on the muscular, metabolic, cardiovascular, respiratory and renal responses and adaptations to exercise. Only 1 unit of credit allowed to students who have completed Exercise Science 101. Only 3 units of credit allowed to students who have completed Exercise Science 102. Not open for credit to students who have completed Exercise Science 101 and 102 (Former Exercise Science 101 and 102). GE credit: SciEng | SE, SL—F, S. (F, S.) Bodine, Shaffrath

#### 102. Introduction to Motor Learning and the Psychology of Sport and Exercise (4)

Lecture—4 hours. Prerequisite: Psychology 1 recommended. Theoretical and practical issues in motor learning, sport psychology, and exercise psychology. Emphasis on how motor skills are acquired and retained, and on the application of social psychology and human motivation studies to human performance. Only 2 units of credit allowed to students who have completed Exercise Science 104. Only 2 units of credit allowed to students who have completed Exercise Science 105. Not open for credit to students who have completed Exercise Science 104 and 105. (Former Exercise Science 104 and 105.) GE credit: SocSci | SS—W. (W.) Salitsky

#### 103. Analysis and Control of Human Movement (4)

Lecture—4 hours. Prerequisite: Cell Biology and Human Anatomy 101 and 101L, Physics 7A and 7B. Neurobiology, Physiology, and Behavior 101 recommended. Introduction to functional anatomy, neurophysiological basis of motor control, and biomechanics of human movement. Human movement understood in the context of body structures, basic principles of physics, and functional characteristics of nerve and muscle. Only 1 unit of credit allowed to students who have completed Exercise Science 103. Only 3 units of credit allowed to students who have completed Exercise Science 104. Not open for credit to students who have completed Exercise Science 103 and 104. (Former Exercise Science 103 and 104.) GE credit: SciEng | QL, SE—S. (S.) Hawkins

#### 104L. Exercise Biology Laboratory (3)

Laboratory—3 hours; lecture—1 hour; discussion—1 hour. Prerequisite: course 101, 102, 103 (the last course may be taken concurrently). Principles and analytical procedures for assessing fundamental physiological, biomechanical, motor learning and motor control factors which underlie human movement and performance. Only 1 unit of credit allowed to students who have completed Exercise Science 101L. Only 1 unit of credit allowed to students who have completed Exercise Science 103. Not open for credit to students who have completed Exercise Science 101 and 103. GE credit: SciEng, Wrt | SE, WE—F, S. (F, S.) Shaffrath

#### 106. Human Gross Anatomy (4)

Lecture—4 hours. Prerequisite: Biological Sciences 2A; concurrent enrollment in course 106L or Cell Biology and Human Anatomy 101L strongly recommended. Upper division students only; Pass One open to upper division Exercise Biology or Anthropology majors only; Pass Two open to Seniors in any major; open enrollment at the start of the quarter for upper division students in any major. Detailed study of the gross anatomical structure of the human body, with emphasis on function and clinical relevance to students entering health care professions. (Same course as Cell Biology and Human Anatomy 101.) GE credit: SciEng | SE—W. (W.) Gross

#### 106L. Human Gross Anatomy Laboratory (3)

Laboratory—9 hours. Prerequisite: Biological Sciences 2A; must take course 106 or Cell Biology and Human Anatomy 101 concurrently (or have already completed). Upper division students only; Pass One open to upper division Exercise Biology or Anthropology majors only; Pass Two open to Seniors in any major; open enrollment at the start of the quarter for upper division students in any major; mandatory attendance on first day of lab. Detailed study of dissected human cadavers in small group format with extensive hands-on experience. (Same course as Cell Biology and Human Anatomy 101L.) GE credit: SciEng | SE—W. (W.) Gross

#### 110. Exercise Metabolism (3)

Lecture—3 hours. Prerequisite: course 101 or Neurobiology, Physiology and Behavior 101. Exercise metabolism, with emphasis on skeletal muscle and cardiac muscle metabolism during activity and inactivity. Basics of bioenergetics, substrate utilization, and cell signaling; mechanisms that regulate these

properties, and differences between skeletal muscle and cardiac muscle metabolism. GE credit: SciEng | SE—S. (S.) Gomes

#### 111. Environmental Effects on Physical Performance (3)

Lecture—2 hours; discussion/laboratory—3 hours. Prerequisite: courses 101 or consent of instructor. The effects of thermal, barometric and gravitational conditions on physiological function and physical performance of humans. Acute and chronic effects, emphasizing physiological adaptations and limitations, will be studied. GE credit: SciEng | QL, SE—W. (W.) Shaffrath

#### 112. Clinical Exercise Physiology (4)

Lecture—3 hours; laboratory/discussion—3 hours. Prerequisite: courses 101 or consent of instructor. Physical activity as a therapeutic modality in normal and diseased populations (cardiovascular, pulmonary, diabetic). Effects of exercise and inactivity in terms of normal physiology, pathophysiology, and therapeutic benefit. Exercise fitness and disease assessment methods. GE credit: SciEng | SE, SL—W. (W.) Shaffrath

#### 115. Biomechanical Bases of Movement (3)

Lecture—2 hours; laboratory—3 hours to alternate weekly with discussion—1 hour. Prerequisite: course 103 or consent of instructor. Biomechanical bases of human movement investigated; topics include musculo-skeletal mechanics, tissue mechanics, electromyography, and measurement and analysis techniques. Application made to sport, clinical, and work environments, including extensive analysis of locomotion. GE credit: SciEng | QL, SE, VL, WE—F. (F.) Liets

#### 116. Nutrition for Physically Active Persons (3)

Lecture—3 hours. Prerequisite: course 101, Neurobiology, Physiology, and Behavior 101. The role of nutrition and exercise in modifying metabolism, body composition, performance and health of humans. Offered irregularly. GE credit: SciEng | SE.

#### 117. Exercise and Aging in Health and Disease (3)

Lecture—2 hours; discussion—1 hour. Prerequisite: course 101 or 113 (concurrently). Etiology of and standard therapy for various diseases associated with aging (e.g., cardiovascular, pulmonary, and renal diseases, diabetes, obesity, lipemias, etc.). Exercise will then be considered as a protective and/or therapeutic modality. GE credit: SciEng | SE—S. (S.) Shaffrath

#### 120. Sport in American Society (3)

Lecture—3 hours. Sociological approaches to the study of sport and contemporary American culture, including sport interaction with politics, economics, religion, gender, race, media and ethics. Socialization factors involving youth, scholastic, collegiate, and Olympic sport. (Same course as Physical Education 120.) GE credit: SocSci, Div | SS—F, S. (F, S.)

#### 121. Advanced Sport Psychology (3)

Lecture—3 hours. Prerequisite: course 102; Psychology 1 recommended. Advanced study and consideration of major theoretical and practical issues in sport psychology. Emphasis on practical application to sport and human performance.—Salitsky

#### 122. Psychological Effects of Physical Activity (3)

Lecture—3 hours. Prerequisite: Psychology 1; upper division standing. Physical activity is evaluated in terms of its ability to enhance the quality of life. Topics studied include: individual factors (self concept, type A); special populations (elderly, cardiovascular); and mental health changes (depression, anxiety).—S. (S.) Salitsky

#### 124. Physiology of Maximal Human Performance (4)

Lecture—3 hours; practice—4 hours. Prerequisite: course 101 or permission of instructor; Biological Sciences 101, 102, and 103 recommended. Molecular mechanisms underlying adaptation to training. Learn how to exercise to maximize their own performance as well as learning how the frequency, inten-

sity and timing of exercise and nutrition affect the molecular signals that underlie performance. GE credit: SciEng | SE. —S. (S.)

### **125. Neuromuscular and Behavioral Aspects of Motor Control (3)**

Lecture—2 hours; lecture/discussion—2 hours. Prerequisite: course 101. Factors which affect control of movement from neuropsychological, physiological, behavioral, and mechanical viewpoints. Topics include central vs. peripheral control mechanisms, open and closed loop theories, motor programming, cognitive learning strategies, and the effects of biochemical and biomechanical influences. Offered irregularly. GE credit: SciEng | SE.

### **126. Tissue Mechanics (3)**

Lecture—2 hours; laboratory/discussion—3 hours. Prerequisite: course 103 or Engineering 45 or consent of instructor. Structural and mechanical properties of biological tissues including bone, cartilage, ligaments, tendons, nerves, and skeletal muscle. (Same course as Biomedical Engineering 126.) GE credit: SciEng | QL, SE, SL, WE. —W. (W.) Hawkins

### **148. Theory and Practice of Exercise Testing (1)**

Lecture/discussion—1 hour. Prerequisite: course 112 (may be taken concurrently). Theory and practice of exercise testing applied to older adult populations. Physiological responses to and limitations of exercise testing. Application of exercise testing and training to healthy and diseased populations. (P/NP grading only.) Offered irregularly. GE credit: SE. —Casazza

### **148L. Adult Fitness Testing Laboratory (1)**

Laboratory—3 hours. Prerequisite: courses 148 (concurrently). Testing symptomatic and asymptomatic older adults for functional aerobic capacity, body composition, blood lipids, pulmonary function, and cardiovascular disease risk. Counseling adults in appropriate exercise programs and lifestyle modifications. Two quarters minimum; third quarter permitted. May be repeated two times for credit. (Former course Physical Education 148L) (P/NP grading only.) Offered irregularly. GE credit: QL, SE. —Casazza

### **179. Frontiers in Exercise Biology (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: courses 101, 102 and 103 (may be taken concurrently); 104L recommended. Lectures by leading authorities and discussion of the latest research in newly emerging areas in exercise biology. Offered every fourth year. GE credit: SciEng | SE. —S.

### **189. International Perspectives in Exercise Biology (4)**

Lecture—4 hours. Prerequisite: course 10 or upper division standing in Exercise Biology; consent of instructor: students will be accepted based upon academic merit, personal experience, and academic discipline in order to provide multidisciplinary perspectives. Restricted to 22 students. Compare and contrast exercise science issues between the US and an international location. Identify political, economic, cultural, technological and environmental issues that impact human exercise, physical activity, wellness, and sport from a global perspective. Offered irregularly.

### **190C. Research Conference (1)**

Discussion—1 hour. Prerequisite: upper division standing in Exercise Biology or related biological science and consent of instructor; concurrent enrollment in course 199. Restricted to upper division students. Research findings and methods in exercise biology. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.) —F, W, S. (F, W, S.)

### **192. Exercise Biology Internship (1-12)**

Internship—3-36 hours. Prerequisite: consent of instructor; enrollment dependent on availability of intern positions. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under program faculty supervision. Written report required. May be repeated up to 15 units of credit, including course 92. (P/NP grading only.) —F, W, S. (F, W, S.)

### **194H. Research Honors (2)**

Independent study—6 hours. Prerequisite: senior standing, minimum of 6 units of course 199, 3.500 GPA or greater in major courses, consent of honors thesis adviser. Completion of individual honors research project in Exercise Biology, under the guidance of an Exercise Biology faculty adviser, culminating in written honors thesis. (P/NP grading only.) GE credit: SE. —F, W, S. (F, W, S.)

### **197T. Tutoring in Exercise Biology (1-5)**

Tutorial—3-15 hours. Prerequisite: upper division standing and consent of instructor. Assisting the instructor by tutoring students in exercise biology course-related projects. May be repeated up to 10 units of credit including courses 97T, 97TC and 197TC. No tutorial units will be counted towards the Exercise Biology major. (P/NP grading only.) —F, W, S. (F, W, S.)

### **197TC. Tutoring Exercise Biology in the Community (1-5)**

Tutorial—3-15 hours. Prerequisite: consent of instructor and chairperson. Tutoring in the community in exercise biology related projects under the guidance of the faculty. May be repeated up to 10 units of credit including courses 97T, 97TC, 197T. (P/NP grading only.) —F, W, S. (F, W, S.)

### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor and chairperson. (P/NP grading only.) GE credit: SE. —F, W, S. (F, W, S.)

### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of chairperson. (P/NP grading only.) —F, W, S. (F, W, S.)

## **Courses in Neurobiology, Physiology, and Behavior (NPB)**

### **Lower Division**

#### **10. Elementary Human Physiology (3)**

Lecture—3 hours. Introduction to physiology for non-science majors. Includes basic cell physiology and survey of major organ systems and how they function in homeostasis and human health. Not open for credit to students who have completed course 101. GE credit: SciEng | SE. —W. (W.) Bautista

#### **12. The Human Brain and Disease (3)**

Lecture—3 hours. Normal function and diseases of the human brain and nervous system. Diseases discussed include Parkinson's, Alzheimer's, leprosy, amnesia and schizophrenia. Intended for non-science majors. Not open for credit to students who have completed courses 100, 101, 112, or Psychology 121. GE credit: SciEng. —F. (F.) Cheng, Fioravante, Recanzone

#### **14. Illusions: Fooling the Brain (3)**

Lecture—3 hours. Introduction to perceptual processing in the human nervous system; illusions. GE credit: SciEng | QL, SE, SL. —W. (W.) Ditterich

#### **15. The Biology and Physiology of Aging (4)**

Lecture—3 hours; discussion—1 hour. Broad examination of age-associated changes in body functions. Includes basic cell physiology, a survey of major organ systems and the age-induced alterations in system function. Some age-associated diseases will also be examined. Not open for credit to students who have completed course 15V. Offered irregularly. GE credit: SciEng | SE.

#### **15V. The Biology and Physiology of Aging (4)**

Web virtual lecture—3 hours; web electronic discussion—1 hour. Broad examination of the biological and physiological basis of aging in animals and plants. Concepts in demographic, evolutionary, genetic, and cell aging. Major human organ systems, age-related alterations in system function, and age-related diseases. Intended for non-science majors. Not open for credit to students who have completed course 15. Offered irregularly. GE credit: SciEng | SE, SL. —S. (S.)

### **17. The Path to Cyborgs: Introduction to Prostheses and Human Machine Interfaces (3)**

Lecture—3 hours. Interface of biology and technology. Mind-controlled prosthetic limbs, artificial organs, and implantable devices. Emphasis on basic physiological functions and how they can be replaced by devices. Suitable for majors and non-majors. GE credit: SciEng | SE, SL. —W. (W.) Sutter

### **68. Biology of Drug Addiction and Abuse (3)**

Lecture—3 hours. Broad examination of addictive substances and their use/abuse. Topics include historical perspective, physiological effects, etiology, neurobiology of addiction and the impact of drugs on contemporary society. Intended for non-science majors. Not open for credit to students having completed course 168. GE credit: SciEng. —(S.) Bautista

### **90A. Lower Division Seminar: Issues in Body Weight Regulation (2)**

Seminar—2 hours. Prerequisite: lower division standing, consent of instructor. Limited enrollment. Critical examination of issues in body weight regulation through shared readings, discussions, written assignments, debates and oral presentations. —C. Warden

### **90B. Human Color Perception (2)**

Seminar—2 hours; term paper. Prerequisite: lower division standing. Class size limited to 15 students with lower division standing. Neural determinants of color appearance, and why we see the world in the way we do. Discussions center around demonstrations of color phenomena and what they tell us about the human brain. —Werner

### **90C. Current Issues in Animal Behavior (2)**

Seminar—2 hours. Prerequisite: lower division standing. Limited enrollment. The mechanisms and outcomes of sexual selection (mate choice and mate competition). Theory, current models and evidence that supports or refutes the models. —W. (W.) Herrick

### **90D. Lower Division Seminar: Current Issues in Reproductive Endocrinology (2)**

Seminar—2 hours. Prerequisite: lower division standing. The integrative roles of reproductive hormones in mammalian reproduction and health. Current theory and models regarding hormone function and use in reproductive health and contraception, and evidence that supports or refutes the models. Offered irregularly.

### **90E. Biology of Aging (2)**

Seminar—2 hours. Prerequisite: freshman standing. Current theories on the biology of aging covering genetic, biochemical, and physiological aspects. Emphasis on critical evaluation of controversial and contemporary issues. Offered irregularly.

### **90F. Visual Impairment and Blindness: A World Wide Problem (2)**

Seminar—2 hours. Prerequisite: lower division standing. Examination of various abnormalities of the eye and the important geographic and cultural factors that influence the epidemiology of those abnormalities. Offered irregularly.

### **91C. Research Conference (1)**

Discussion—1 hour. Prerequisite: lower division standing in Neurobiology, Physiology and Behavior or related biological science and consent of instructor; concurrent enrollment in course 99. Restricted to lower division students. Research findings and methods in neurobiology, physiology, and/or behavior. Presentation and discussion of research by faculty and students. (P/NP grading only.) —F, W, S. (F, W, S.)

### **92. Internship (1-12)**

Internship—3-36 hours. Prerequisite: lower division standing; consent of instructor. Work experience off and on campus in all subject areas offered in the Department of Neurobiology, Physiology, and Behavior. Internships supervised by a member of the faculty. May be repeated for credit. (P/NP grading only.) —F, W, S. (F, W, S.)

**98. Directed Group Study (1-5)**

Prerequisite: lower division standing and consent of instructor. (P/NP grading only.)—F, W, S. (F, W, S.)

**99. Special Study for Undergraduates (1-5)**

Prerequisite: lower division standing and consent of instructor. (P/NP grading only.)—F, W, S. (F, W, S.)

**Upper Division****100. Neurobiology (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1AB or 2ABC; Physics 9 ABC or 7ABC. Brains and nervous systems, neurons and neural circuits. Coordination of movement. Development of nervous systems. Vision, hearing, and feature extraction by the central nervous system. The cell biology of learning and memory. Not open for credit to students who have completed course 112, 160, 161 or 162, or Neuroscience 221 or 222. GE credit: QL.—F, W, S. (F, W, S.)

**100L. Neurobiology Laboratory (3)**

Lecture—1 hour; laboratory—3 hours; extensive writing or discussion. Prerequisite: course 100 (may be taken concurrently). Experimental basis of neurobiology principles discussed in course 100. Topics include neurophysiology, sensory systems, motor systems, cellular neuroscience, cognitive neuroscience, and quantitative data analysis and modeling techniques. GE credit: SciEng | SE.—S. (S.) Goldman

**100Q. Quantitative Foundations of Neurobiology (1)**

Autotutorial—1.5 hours; extensive problem solving—1.5 hours. Prerequisite: course 100 (may be taken concurrently). Computational methods and mathematical models used to study phenomena in neurobiology. Offered irregularly. GE credit: QL, VL.—Mogilner, Sutter

**101. Systemic Physiology (5)**

Lecture—5 hours. Prerequisite: Biological Sciences 1A, or 2A and Chemistry 2B; Physics 1B or 7C strongly recommended. Systemic physiology with emphasis on aspects of human physiology. Functions of major organ systems, with the structure of those systems described as basis for understanding the functions. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

**101D. Systemic Physiology Discussion (1)**

Discussion—1 hour. Prerequisite: course 101 (concurrently); consent of instructor. Discussion and problem solving related to fundamental principles of systemic physiology as presented in course 101. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

**101L. Systemic Physiology Laboratory (3)**

Laboratory—3 hours; discussion—2 hours; term paper. Prerequisite: course 101. Selected experiments to illustrate functional characteristics of organ systems discussed in course 101.—F, W, S. (F, W, S.) Bautista, Liets

**102. Animal Behavior (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or 2A, 2B, 2C. Basic principles of behavioral organization in vertebrate and invertebrate animals. Underlying physiological and ethological mechanisms. The evolution of behavior, with special emphasis on behavior under natural conditions. Not open for credit to students who have completed course 155. (Former course 155.) GE credit: SL.—F, S. (F, S.) Britten, Hahn, Nevitt

**102Q. Quantitative Topics in Animal Behavior (1)**

Autotutorial—1.5 hours; extensive problem solving—1.5 hours. Prerequisite: Mathematics 16B; course 102 (may be taken concurrently). Study of the quantitative concepts and exemplar models used in animal behavior. Offered irregularly. GE credit: SciEng.—Hahn

**103. Cellular Physiology/Neurobiology (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 103 or 105, and 104; Physics 7C recommended. Cellular physiology with emphasis on membrane transport processes and neuronal physiology. Fundamental physical-chemical and biological mechanisms of membrane transport will be considered in relation to cytoplasmic homeostasis, communication

between cells, and the cellular mechanisms of sensory and motor transduction. Not open for credit to students who have completed course 100B (Former course 100B.) Offered irregularly.

**104L. Cellular Physiology/Neurobiology Laboratory (4)**

Lecture—1 hour; laboratory—3 hours; discussion—1 hour; term paper or discussion. Prerequisite: courses 101 and 101L; Biological Sciences 103 or 105. Experiments in the physical and chemical processes of cells and tissues. Offered irregularly. GE credit: Wrt.—Liets

**105. Introduction to Computer Models (4)**

Lecture—3 hours; lecture/laboratory—1 hour. Prerequisite: Mathematics 16C or the equivalent, Physics 7C, Chemistry 2C, and course 100 or 101. Introduction to the ideas, mathematical techniques and computer tools required for developing models of cellular processes in physiology and neurobiology. Applications include membrane transport, ionic channels, action potentials,  $\text{Ca}^{2+}$  oscillations, respiration, and muscle contraction. Offered irregularly.

**106. Experiments in Neurobiology, Physiology, and Behavior: Design and Execution (3)**

Laboratory—7.5 hours; discussion—0.5 hours. Prerequisite: course 100 or 101 or 102, and 199 and consent of instructor. Design and execution of experiments in neurobiology, physiology, and/or behavior. Students choose and design a project in consultation with the sponsoring faculty member. May be repeated one time for credit to complete the project, with consent of instructor. An additional repeat is permitted for a different project under the guidance of another faculty member. (P/NP grading only.) GE credit: OL, QL, VL, WE.—F, W, S. (F, W, S.) Rosenquist

**107. Cell Signaling in Health and Disease (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 102 or 105. Basics of cell signaling pathways, their disruption in disease, and their current utility and future potential as therapeutic targets. Focus is on signaling pathways specific to nervous, endocrine and immune systems, and those fundamental to all cells. GE credit: SL.—S. (S.) Trimmer

**110A. Foundations 1: From Molecules to Individuals (5)**

Lecture—4 hours; discussion—1 hour. Prerequisite: Biological Sciences 2A, 2B and 2C, Chemistry 2A and 2B, Physics 7A, 7B, and 7C at least concurrent. Pass One restricted to majors in Neurobiology, Physiology and Behavior. Major concepts in cell biology with special emphasis on connections between cell biology and behavior. Includes: cellular metabolism, cellular sensing and signaling, membrane structure-function, molecular switches, electrical and chemical signaling, endocrine signaling, cell cycle and differentiation, cytoskeleton, and integrative examples. Credit limited to 3 units for students who have taken Biological Sciences 104. GE credit: SciEng | SE.—F, S. (F, S.) Gomes, Hahn

**110B. Foundations 2: Neurobiology (5)**

Lecture—4 hours; discussion—1 hour. Prerequisite: Physics 7C and course 110A completed with a grade of C- or above. Open to declared NPB majors only. Core concepts of neurobiology including single-neuron biophysics, synapses and transmitters, neuronal development, motor systems, central pattern generation, neuronal circuits, intracellular signal transduction, sensory processing, multisensory integration, autonomic nervous system, neuromodulation, learning and memory, and higher cognition and disease. Credit limited to 2 units for students who have taken course 100. GE credit: SciEng | SE.—F, W. (F, W.) Britten, Sutter

**110C. Foundations 3: Physiology (5)**

Lecture—4 hours; discussion—1 hour. Prerequisite: course 110B completed with a grade of C- or above. Open to declared NPB majors only. Focuses on the structure, function, and interactions of animal organ systems in homeostasis and reproduction, and the response to perturbations of homeostasis; neural

and endocrine signaling; skeletal muscle and movement; cardiovascular and respiratory systems; renal, digestive, immune, and reproductive physiology. Credit limited to two units for students who have taken course 101. GE credit: SciEng | SE.—W, S. (W, S.) Furlow, Usrey

**111C. Advanced Systemic Physiology Laboratory (3)**

Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 101, 101L, Statistics 13; course 112, 113, or 114 recommended. Interfacing physiological recording equipment with microcomputers; data acquisition and analysis using the microcomputer; data interpretation within the framework of physiological concepts. Offered irregularly. GE credit: QL, VL, WE.

**111L. Advanced Systemic Physiology Laboratory (4)**

Lecture—1 hour; discussion—2 hours; laboratory—6 hours; term paper. Prerequisite: courses 101 and 101L. Selected comprehensive experiments in the autonomic nervous system and the cardiovascular, respiratory, and neuromuscular systems. Emphasis on conceptual and methodological approaches in demonstrating the physiology of organ systems. GE credit: Wrt.—W. (W.) Liets

**112. Neuroscience (3)**

Lecture—3 hours. Prerequisite: course 100 or 101. Presentation of concepts in neuroscience including sensory systems, motor systems, and higher neural integration. Emphasis on mammalian nervous system. Offered irregularly. GE credit: SL.

**113. Cardiovascular, Respiratory, and Renal Physiology (4)**

Lecture—4 hours. Prerequisite: course 101; Chemistry 7B, Physics 7B and 7C recommended. An intense and advanced presentation of concepts in cardiovascular, respiratory, and renal physiology including discussion of acid-base balance.

**114. Gastrointestinal Physiology (3)**

Lecture—3 hours. Prerequisite: course 101; Biological Sciences 105 or 103 recommended, 105 preferred. Gastrointestinal anatomy and physiology. Digestion, secretion, absorption, motility, comparative physiology and pathology. Strong emphasis on neural and hormonal regulation and on cellular mechanisms of secretion and absorption.—F. (F.) Bautista, Horwitz

**117. Avian Physiology (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 1B, or 2A and 2B and Chemistry 2B; course 101 strongly recommended. Physiology of the various systems of birds with emphasis on digestion, respiration, excretion, and endocrine systems.—S. (S.) Hahn, Klasing

**121. Physiology of Reproduction (4)**

Lecture—4 hours. Prerequisite: course 101. Physiological mechanisms related to reproduction, breeding efficiency and fertility, with special reference to domestic animals. GE credit: QL, SL.—W. (W.) Berger

**121L. Physiology of Reproduction Laboratory (1)**

Laboratory—3 hours. Prerequisite: course 121 recommended (may be taken concurrently). Experiments on the reproductive systems of domestic animals including male and female gametes. (P/NP grading only.)—W. (W.) Berger

**122. Developmental Endocrinology (3)**

Lecture—3 hours. Prerequisite: course 101. Restricted to upper division standing. Hormonal control of development, maturation and senescence from the cellular to organismal level, with emphasis on the human. Prenatal and neonatal life, childhood and adolescence, adulthood and pregnancy, as well as the endocrinology of aging. Offered irregularly.

**123. Comparative Vertebrate Organology (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Science 1A and 1B or 2A and 2B. Functional anatomy of major organ systems in vertebrates. Each system examined from cellular to gross

level in fish, birds, and mammals. Emphasis on how differentiated cell types are integrated into tissues and organs to perform diverse physiological functions. (Same course as Anatomy, Physiology and Cell Biology 100.) —W. Ginotos

#### **124. Comparative Neuroanatomy (4)**

Lecture—3 hours; laboratory—2 hours. Prerequisite: Psychology 101, or course 100 or 101. Overview of the neuroanatomy of the nervous system in a variety of mammalian and non-mammalian vertebrates. Examine changes or modifications to neural structures as a result of morphological or behavioral specializations. (Same course as Psychology 124.) GE credit: SL. —W. (W.) Krubitzer, Recanzone

#### **125. Comparative Physiology: Neurointegrative Mechanisms (3)**

Lecture—3 hours. Prerequisite: course 101. Comparisons of physiological functions in the animal kingdom: neurointegrative mechanisms of integration including aspects of phylogenetic development at both neuronal and systemic levels. Offered irregularly.

#### **126. Comparative Physiology: Sensory Systems (3)**

Lecture—3 hours. Prerequisite: course 100 or 101. Basic physiological mechanisms involved in sensory systems. Comparative approach to considerations of mechanosensitive systems (audition, lateral lines, touch, echolocation, equilibrium), chemosensitive systems (olfaction, taste, pheromones), photosensitive systems (vision, infrared detection, UV detection), electoreception, and pain. Emphasis on receptors. Offered irregularly.

#### **127. Comparative Physiology: Circulation (3)**

Lecture—3 hours. Prerequisite: course 101. Comparisons of physiological functions in the animal kingdom: circulation. Comparative approach to cardiovascular function in vertebrates and invertebrates. Offered irregularly. GE credit: SL, VL.

#### **128. Comparative Physiology: Endocrinology (3)**

Lecture—3 hours. Prerequisite: course 101. Comparison of physiological functions in the animal kingdom: animal hormones and their functions. —W. (W.)

#### **130. Physiology of the Endocrine Glands (4)**

Lecture—4 hours. Prerequisite: course 101. Advanced presentation of concepts in endocrinology with emphasis on the role of hormones in reproduction, metabolism, and disease. GE credit: VL. —F. (F.)

#### **132. Nature vs. Nurture: Physiological Interactions Among Genes, Nutrients and Health (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 1A or 2A or consent of the instructor. Biochemical, physiological, genetic, and nutritional causes of important medical problems such as obesity, anorexia, heart disease and diabetes. One unit of credit allowed to students who have completed course 131. GE credit: SciEng. —F. (F.) Phinney, Warden

#### **139. Frontiers in Physiology (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: courses 100 and 101; 102 (may be taken concurrently). Lectures by leading authorities and discussion of the latest research in newly emerging areas in physiology. Offered every fourth year. Offered irregularly. GE credit: SciEng | QL, SE.

#### **140. Principles of Environmental Physiology (3)**

Lecture—3 hours. Prerequisite: course 101; Biological Sciences 102 recommended. Physiological aspects of interactions of organisms and environmental, cellular, system, and organismal levels. Emphasis on regulatory responses/mechanisms to thermal, pressure, gravity and light environmental variables. Not open for credit to students who have completed course 148. (Former course 148.) GE credit: WE. —W. Fuller

#### **141. Physiological Adaptation of Marine Organisms (3)**

Lecture—2 hours; laboratory—3 hours. Prerequisite: upper division standing; consent of the instructor; residence at Bodega Marine Laboratory required. Students must submit application available at <http://www.bml.ucdavis.edu>. Physiological adaptation to the environment among organisms in marine and estuarine habitats. GE credit: QL, VL, WE. —S. (S.) Cheng, Cherr

#### **141P. Physiological Adaptation of Marine Organisms/Advanced Laboratory Topics (5)**

Laboratory—12 hours; discussion—1 hour. Prerequisite: course 141 concurrently; residence at Bodega Marine Laboratory required. Students must submit application available at <http://www.bml.ucdavis.edu>. Training in scientific research from hypothesis to publication, including methods of library research. Research related to a topic covered in course 141. GE credit: VL, WE. —S. (S.) Cherr

#### **142. Environmental Endocrinology: Mechanisms for Life Cycles (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 2A, 2B, 2C. Effects of environmental factors on endocrine responses that affect vertebrate life history and fitness. Introduction to finite state machine theory and allostatic in life histories and coping strategies. Focus on life history stages including non-breeding, hibernation, reproduction, migration and moult. GE credit: SciEng | SE, WE. —W. (W.) Wingfield

#### **150. Advanced Animal Behavior (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 102 or Psychology 101. Advanced integrative survey of biological principles of behavioral organization, emphasizing historical roots, current research directions, conceptual issues and controversies. Laboratory exercises on the description and analysis of the behavior of captive and free-living animals. (Same course as Psychology 122.) Offered irregularly. —Hahn

#### **152. Hormones and Behavior (3)**

Lecture—3 hours. Prerequisite: course 101, and either course 102 or Psychology 101. Endocrine physiology with an emphasis on the principles of behavior. Fundamental relationships between hormones and various behaviors engaged in by the organism during its lifetime. Role of hormones in behavioral homeostasis, social behavior, reproductive behavior, parental behavior, adaptation to stress. (Same course as Psychology 123.) —S. (S.) Bales, Furlow, Hahn, Trainor, Wingfield

#### **159. Frontiers in Behavior (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: courses 100, 101, 102. Lectures by leading authorities and discussion of the latest research in newly emerging areas in behavioral biology. Offered every fourth year. Offered irregularly. GE credit: SciEng | QL, SE.

#### **160. Molecular and Cellular Neurobiology (3)**

Lecture—1.5 hours; discussion—1.5 hours. Prerequisite: course 100, Biological Sciences 101 and consent of instructor. Selected topics in neurobiology. Topics include channel biophysics, action potential propagation, intracellular signal transduction pathways, synaptic physiology and quantal analysis, cellular mechanisms of synaptic plasticity, and neuromodulation of synaptic circuitry. (Same course as Neuroscience 160.) Offered irregularly. GE credit: VL.

#### **160L. Advanced Cellular Neurobiology Laboratory (4)**

Laboratory—12 hours. Prerequisite: course 160, Physics 7C recommended. Students will learn to record neural activity, to interpret their recordings, and to label neurons with antibodies against neurotransmitters. Offered irregularly.

#### **161. Developmental Neurobiology (3)**

Lecture—3 hours. Prerequisite: course 100 or 101. Issues, theoretical concepts, and methodologies in developmental neurobiology. Topics include prenatal and postnatal differentiation of neurons, and plas-

ticity in the mature and aging brain. Integration of neurochemical, structural, physiological and behavioral perspectives. GE credit: SciEng | SE. —W. (W.) McAllister, Zito

#### **162. Neural Mechanisms of Behavior (3)**

Lecture—3 hours. Prerequisite: course 100 or 101. The relationship between brain and behavior. Identification and analysis of the relevant neural circuits involved. Examples of systems to be considered are birdsong, locomotion, echolocation. —S. (S.) Britten

#### **163. Systems Neuroscience (3)**

Lecture—3 hours. Prerequisite: course 100 or equivalent basic neuroscience training with consent of instructor. Concepts and techniques in systems neuroscience: e.g., measuring and manipulating neural activity, structure of neocortex, sensory processing, motor control, short-term and long-term storage of information, neural codes, neural mechanisms underlying cognitive functions. GE credit: SE. —S. (S.) Ditterich

#### **164. Mammalian Vision (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100, 112, or Psychology 101. Structure and function of the mammalian visual system, from the formation of images on the retina through visually guided behavior and perception. Emphasis on biological mechanisms underlying vision. —W. (W.) Britten, Werner

#### **165. Neurobiology of Speech Perception (3)**

Lecture—3 hours. Prerequisite: course 100 or 101, or consent of instructor. Interdisciplinary approach to speech perception with emphasis on functional neuroanatomy and behavior. Topics include auditory processing in time and space, intelligibility in noisy environments, visual speech, evolution of vocal communication, models of speech perception, development, and hearing impairment. GE credit: SL. —S. (S.) Miller

#### **166. Math Tools for Neuroscience (4)**

Lecture—4 hours. Prerequisite: course 100 or permission of instructor; Math 16A, B, C or equivalent; Physics 7C strongly recommended. Introduction to mathematics techniques used in neuroscience. Applications to neuroscience of differential equations, linear algebra, Fourier transforms, correlation and convolution, and probability theory. Offered irregularly. GE credit: QL. —Goldman

#### **167. Computational Neuroscience (5)**

Lecture—4 hours; lecture/laboratory—3 hours. Prerequisite: course 100 or permission of instructor; Math 17A, 17B, 17C, or equivalent; Physics 7A, B, C or equivalent strongly recommended; consent of instructor. Mathematical models and data analysis techniques used to describe computations performed by nervous systems. Lecture topics include single neuron biophysics, neural coding, network dynamics, memory, plasticity, and learning. Lab topics include programming mathematical models and data analysis techniques in MATLAB. Offered irregularly. GE credit: SciEng | SE, QL. —Goldman

#### **168. Neurobiology of Addictive Drugs (4)**

Lecture/discussion—4 hours. Prerequisite: course 100 or 101 or the equivalent. Neurobiological basis for the effects and mechanisms of action of drugs with addictive potential, including opiates (morphine, heroin, methadone), amphetamines, cocaine, nicotine, marijuana (cannabinoids), alcohol, caffeine, and mind-altering drugs such as LSD and anti-depressants. GE credit: SL, VL. —S. (S.) Liets

#### **169. Frontiers in Neurobiology (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: courses 100 and 101, course 102 (may be taken concurrently). Lectures by leading authorities and discussion of the latest research in newly emerging areas in neurobiology. Offered every fourth year. Offered irregularly. GE credit: QL.

#### **190C. Research Conference (1)**

Discussion—1 hour. Prerequisite: upper division standing in Neurobiology, Physiology, and Behavior or related biological science and consent of instructor; concurrent enrollment in course 199. Research findings and methods in neurobiology, physiology,

and/or behavior. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

### **192. Internship (1-12)**

Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in all subject areas offered in neurobiology, physiology, & behavior. May be repeated for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

### **194HA. Neurobiology, Physiology, and Behavior-Honors (1)**

Laboratory—3-12 hours. Prerequisite: senior standing; minimum 3.500 GPA in courses counted toward major; approval by the Master Adviser. Honors project in Neurobiology, Physiology, and Behavior. Laboratory research on a specific question. The project is developed with the sponsoring faculty member and approved by the student's Honors Thesis Committee. Honors thesis to be submitted upon completion of the project. (P/NP grading only.)—F, W, S. (F, W, S.)

### **194HB. Neurobiology, Physiology, and Behavior-Honors (1-4-2)**

Laboratory—12 hours. Prerequisite: senior standing; minimum 3.500 GPA in courses counted toward major; approval by the Master Adviser. Honors project in Neurobiology, Physiology, and Behavior. Laboratory research on a specific question. The project is developed with the sponsoring faculty member and approved by the student's Honors Thesis Committee. Honors thesis to be submitted upon completion of the project. (P/NP grading only.)—F, W, S. (F, W, S.)

### **194HC. Neurobiology, Physiology, and Behavior-Honors (2)**

Laboratory—3-12 hours. Prerequisite: senior standing; minimum 3.500 GPA in courses counted toward major; approval by the Master Adviser. Honors project in Neurobiology, Physiology, and Behavior. Laboratory research on a specific question. The project is developed with the sponsoring faculty member and approved by the student's Honors Thesis Committee. Honors thesis to be submitted upon completion of the project. (P/NP grading only.)—F, W, S. (F, W, S.)

### **197T. Tutoring in Neurobiology, Physiology, and Behavior (1-5)**

Discussion—2-6 hours. Prerequisite: upper division standing and consent of instructor. Assisting the instructor by tutoring students in one of the Department's regular courses. May be repeated for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

### **198. Directed Group Study (1-5)**

(P/NP grading only.)—F, W, S. (F, W, S.)

### **199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.)—F, W, S. (F, W, S.)

## **Graduate**

### **211. Advanced Topics in Neuroimaging (2)**

Seminar—2 hours. Prerequisite: Psychology 210 or consent of instructor. Restricted to 16 students. Critical presentation and discussion of the most influential advanced issues in neuroimaging, emphasizing fMRI design/analysis and the integration of fMRI with EEG/MEG. (Same course as Neuroscience 211 and Psychology 211.) May be repeated for credit. (S/U grading only.)—W. (W.) Miller

### **212. Light and Fluorescence Microscopy (2)**

Lecture—2 hours. Prerequisite: consent of instructor. Restricted to maximum 16 students. Theory and practical application of light and fluorescence microscopy in the biological sciences. (S/U grading only.)—W. (W.) Zito

### **217. Advanced Avian Physiology (1)**

Project—1 hour. Prerequisite: graduate standing and concurrent enrollment in course 117; consent of instructor. Study in depth of a topic in avian physiol-

ogy through development of a lecture with associated instructional materials such as lesson plan, readings, presentation, and evaluation aids.—S. (S.) Millam

### **221. Cellular Neuroscience (4)**

Lecture—3 hours; discussion—1.5 hours. Advanced course on cellular and subcellular organization of the nervous system. Membrane channels, sensory transduction, synaptic transmission and cellular aspects of development and learning.—F. (F.) Burns, McAllister, Trimmer, Zito

### **222. Systems Neuroscience (5)**

Lecture—4 hours; discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Integrative and information-processing aspects of nervous system organization. Topics include sensory systems, motor function, sensorimotor integration, the limbic system, and the neurobiology of learning and memory. (Same course as Neuroscience 222.)—W. (W.) DeBello, Ditterich, Usrey

### **245. Computational Models of Cellular Signaling (3)**

Lecture—3 hours. Prerequisite: consent of instructor. Computational and mathematical techniques in modeling of regulatory and signaling phenomena in neurobiology and cell physiology, focusing on linear and nonlinear ordinary differential equation models. Applications include ion channel kinetics, electrical activity, signal transduction, calcium oscillations, and simple neural circuits. Offered irregularly.

### **247. Topics in Functional Neurogenomics (2)**

Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing or consent of instructor. The theory, methods and principles of functional neurogenomics with emphasis on the relationship to molecular mechanisms involved in development and disease of the nervous system. (Same course as Neuroscience 247.)

### **261A. Topics in Vision: Eyes and Retinal Mechanisms (2)**

Lecture/discussion—2 hours. Prerequisite: graduate standing, course 100 or 112 or the equivalent. Structure and function of the visual system, with emphasis on the eye and retina, including optics, anatomy, transduction, retinal synapses, adaptation, and parallel processing. (Same course as Neuroscience 261A and Molecular, Cellular, and Integrative Physiology 261A.) (S/U grading only.)—(F.) Ishida

### **261B. Topics in Vision: Systems, Psychophysics, Computational Models (2)**

Lecture/discussion—2 hours. Prerequisite: consent of instructor, course 261A recommended. Functions of the central visual pathways and their underlying mechanisms. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system. (Same course as Neuroscience, Physiology, and Behavior 261B and Molecular, Cellular, and Integrative Physiology 261B.) (S/U grading only.) Offered in alternate years.—(W.) Britten

### **261C. Topics in Vision: Clinical Vision Science (2)**

Lecture/discussion—2 hours. Prerequisite: courses 261A and 261B or consent of instructor. Causes and mechanistic bases of major blinding diseases. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system related to disease. (Same course as Neuroscience 261C and Molecular, Cellular, and Integrative Physiology 261C.) Offered irregularly. (S/U grading only.)—(S.) Werner

### **263. Modeling in Systems Neuroscience (4)**

Lecture—3 hours; lecture/laboratory—1 hour. Prerequisite: consent of instructor. Modeling as a tool in systems neuroscience. Mathematical techniques will be introduced and used to explore advanced topics in echolocation, sound localization, electrorecep-

tion, communications, and motor systems. Other topics include transforms, modeling assumptions, scales and linearity. Offered in alternate years.

### **267. Computational Neuroscience (5)**

Lecture—4 hours; lecture/laboratory—3 hours. Prerequisite: one course in general neuroscience at the level of course 100; one year college-level Calculus at level of Math 16A, B, C; one year Physics at the level of Physics 7A, B, C, strongly recommended; students from other departments should contact the instructor. Mathematical models and data analysis techniques used to describe computations performed by nervous systems. Lecture topics include single-neuron biophysics, neural coding, network dynamics, memory, plasticity, and learning. Lab topics include programming mathematical models and data analysis techniques in MATLAB. Offered in alternate years. (Same course as Neuroscience 267.)—(F.) Goldman

### **270. How to Write a Fundable Grant Proposal in the Biomedical Sciences (2)**

Lecture/discussion—2 hours. Prerequisite: consent of instructor. Restricted to members of the Neuroscience and BMCDB graduate groups; graduate students in other biomedical programs may enroll with instructor permission. Teaches the do's and don'ts of writing grants in the biomedical sciences and the mechanisms of the review process. Offered in alternate years. May be repeated for credit. (Same course as Neurobiology, Physiology and Behavior 270.)—(S.) Burns

### **285. Literature in Visual Neuroscience (2)**

Seminar—2 hours. Literature in Visual Neuroscience. (Same course as Neuroscience 285.) May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.) Britten, Ditterich, Goldman, Usrey

### **287A. Topics in Theoretical Neuroscience (2)**

Seminar—2 hours. Prerequisite: consent of instructor. In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature. Offered in alternate years. May be repeated for credit. (Same course as Neuroscience 287A.) (S/U grading only.)—F. Ditterich, Goldman

### **287B. Topics in Theoretical Neuroscience (2)**

Seminar—2 hours. Prerequisite: consent of instructor. In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature. May be repeated for credit. (Same Course as Neuroscience 287B.) (S/U grading only.)—S. Ditterich, Goldman

### **291. Auditory Neuroscience (1)**

Seminar—0.5 hours; discussion—0.5 hours. Prerequisite: course 100 or 112 or Neuroscience 222 or the equivalent. Exploration of various important aspects of auditory physiology, behavior and psychophysics through review of original literature. New topic each quarter. May be repeated for credit with consent of instructor. (S/U grading only.)—F, W, S. (F, W, S.) Recanzone, Sutter

## **Neuroscience**

**See Neurobiology, Physiology, and Behavior, on page 478; and Neuroscience (A Graduate Group).**

# Neuroscience (A Graduate Group)

W. Martin Usrey, Ph.D., Chairperson of the Group  
**Group Office.** 148 Center for Neuroscience  
 530-757-8845;  
<http://neuroscience.ucdavis.edu/grad>

## Faculty

Leonard J. Abbeduto, Ph.D., Professor  
*(Psychiatry and Behavioral Sciences)*  
 David Amaral, Ph.D., Professor  
*(Psychiatry and Behavioral Sciences)*  
 Robert Berman, Ph.D., Professor  
*(Neurological Surgery)*  
 Laura Borodinsky, Ph.D., Assistant Professor  
*(Physiology and Membrane Biology)*  
 Kenneth H. Britten, Ph.D., Professor  
*(Neurobiology, Physiology, and Behavior)*  
 Marie Burns, Ph.D., Professor  
*(Ophthalmology and Vision Science)*  
 Earl E. Carstens, Ph.D., Professor  
*(Neurobiology, Physiology, and Behavior)*  
 Cameron Carter, M.D., Professor  
*(Psychiatry and Behavioral Sciences)*  
 Tsung-Yu Chen, M.D., Ph.D., Professor  
*(Neurology)*  
 Hwai-Jong Cheng, M.D., Ph.D., Professor  
*(Neurobiology, Physiology, and Behavior)*  
 Gino Cortopassi, Ph.D., Professor  
*(Molecular Biosciences)*  
 Jacqueline Crawley, Ph.D., Professor  
*(Psychiatry and Behavioral Sciences)*  
 William DeBello, Ph.D., Associate Professor  
*(Neurobiology, Physiology, and Behavior)*  
 Charles DeCarli, M.D., Professor *(Neurology)*  
 Wenbin Deng, Ph.D., Associate Professor  
*(Biochemistry and Molecular Medicine)*  
 Elva Diaz, Ph.D., Associate Professor  
*(Pharmacology)*  
 Jochen Ditterich, Ph.D., Associate Professor  
*(Neurobiology, Physiology, and Behavior)*  
 Arne Ekstrom, Ph.D., Associate Professor  
*(Psychology)*  
 Michael Ferns, Ph.D., Professor  
*(Anesthesiology and Pain Medicine)*  
 Joy Geng, Ph.D., Associate Professor *(Psychology)*  
 Mark Goldman, Associate Professor  
*(Neurobiology, Physiology and Behavior)*  
 Qizhi Gong, Ph.D., Associate Professor  
*(Cell Biology and Human Anatomy)*  
 Fredric Gorin, M.D., Ph.D., Professor *(Neurology)*  
 John Gray, M.D., Ph.D., Assistant Professor  
*(Neurology)*  
 Randi Hagerman, M.D., Professor *(Pediatrics)*  
 Hanks, Tim, Ph.D., Assistant Professor *(Neurology)*  
 Johannes Hell, Ph.D., Professor *(Pharmacology)*  
 Andrew T. Ishida, Ph.D., Professor  
*(Neurobiology, Physiology, and Behavior)*  
 Li-En Jao, Ph.D., Assistant Professor  
*(Cell Biology and Human Anatomy)*  
 Petr Janata, Ph.D., Professor *(Psychology)*  
 Lee-Way Jin, Ph.D., Professor  
*(Pathology and Laboratory Medicine)*  
 Paul S. Knoepfle, Ph.D., Associate Professor  
*(Cell Biology and Human Anatomy)*  
 Leah Krubitzer, Ph.D., Professor *(Psychology)*  
 Janine LaSalle, Ph.D., Professor  
*(Medical Microbiology and Immunology)*  
 Pamela Lein, Ph.D., Professor  
*(Molecular Biosciences)*  
 Steven Luck, Ph.D., Professor *(Psychology)*  
 Bruce Lyeth, Ph.D., Professor  
*(Neurological Surgery)*  
 G. R. Mangun, Ph.D., Professor *(Psychology)*  
 Martinez-Cerdeno, Veronica, Ph.D., Assistant Professor  
*(Pathology and Laboratory Medicine)*  
 Kimberley A. McAllister, Ph.D., Professor *(Neurology & Neurobiology, Physiology, and Behavior)*  
 Lee Miller, Ph.D., Associate Professor  
*(Neurobiology, Physiology, and Behavior)*  
 John Morrison, Ph.D. *(Neurology)*  
 Stephen Noctor, Ph.D., Assistant Professor  
*(Psychiatry and Behavioral Sciences)*

Alex Nord, Ph.D., Assistant Professor  
*(Neurobiology, Physiology, and Behavior)*  
 Christine Nordahl, Assistant Professor  
*(Psychiatry and Behavioral Sciences)*  
 John Olichney, M.D., Professor  
*(Neurology)*  
 Isaac N. Pessah, Ph.D., Professor  
*(Molecular Biosciences)*  
 David Pleasure, M.D., Professor  
*(Neurology and Pediatrics)*  
 Edward N. Pugh, Ph.D., Professor  
*(Cell Biology and Human Anatomy)*  
 J. Daniel Ragland, Ph.D., Professor  
*(Psychiatry and Behavioral Sciences)*  
 Charan Ranganath, Ph.D., Professor *(Psychology)*  
 Gregg H. Recanzone, Ph.D., Professor  
*(Neurobiology, Physiology, and Behavior)*  
 David Richman, M.D. Professor *(Neurology)*  
 Susan Rivera, Ph.D., Professor *(Psychology)*  
 Michael Rogawski, M.D., Ph.D., Professor  
*(Neurology)*  
 Karen Ryan, Ph.D., Assistant Professor  
*(Neurobiology, Physiology, and Behavior)*  
 Julie Schweiter, Ph.D., Professor  
*(Psychiatry and Behavioral Sciences)*  
 Kiarash Shahaie, M.D., Ph.D., Assistant Professor  
*(Neurological Surgery)*  
 Frank Sharp, M.D., Professor *(Neurology)*  
 Jill Silverman, Ph.D., Assistant Professor  
*(Psychiatry and Behavioral Sciences)*  
 Sergi Simo, Ph.D., Assistant Professor  
*(Cell Biology and Human Anatomy)*  
 Tony Simon, Ph.D., Professor  
*(Psychiatry and Behavioral Sciences)*  
 Danielle Stolzenberg, Ph.D., Assistant Professor  
*(Psychology)*  
 Mitchell L. Sutler, Ph.D., Professor  
*(Neurobiology, Physiology, and Behavior)*  
 Diane Swick, Ph.D., Associate Adjunct Professor  
*(Neurology)*  
 Lin Tian, Ph.D., Assistant Professor  
*(Biochemistry and Molecular Medicine)*  
 Brian Trainor, Ph.D., Associate Professor  
*(Psychology)*  
 James Trimmer, Ph.D., Professor  
*(Neurobiology, Physiology, and Behavior)*  
 W. Martin Usrey, Ph.D., Professor *(Neurology & Neurobiology, Physiology, and Behavior)*  
 John S. Werner, Ph.D., Professor  
*(Ophthalmology and Vision Science)*  
 Brian Wiltgen, Ph.D., Associate Professor  
*(Psychology)*  
 Yang (Kevin) Xiang, Ph.D., Associate Professor  
*(Pharmacology)*  
 Andrew Yonelinas, Ph.D., Professor *(Psychology)*  
 Konstantinos Zarbalis, Ph.D., Assistant Professor  
*(Pathology)*  
 Min Zhao, M.D., Ph.D., Professor  
*(Dermatology)*  
 Chengji Zhou, Ph.D., Associate Professor  
*(Cell Biology and Human Anatomy)*  
 Karen Zito, Ph.D., Associate Professor  
*(Neurobiology, Physiology, and Behavior)*

## Emeriti Faculty

Leo M. Chalupa, Ph.D., Professor  
*(Neurobiology, Physiology, and Behavior)*  
 Edward G. Jones, M.D., Ph.D., Professor *(Psychiatry)*  
 Brian Mulloney, Ph.D., Professor  
*(Neurobiology, Physiology, and Behavior)*  
 Karen Sigvardt, Ph.D., Adjunct Professor  
*(Neurology)*  
 David Woods, Ph.D., Adjunct Professor  
*(Neurology)*  
**Graduate Study.** The Graduate Group in Neuroscience offers programs of study leading to the Ph.D. degree. Neuroscience is a broad, interdepartmental program with faculty interests ranging from molecular biophysics of channels to cortical organization and cognition. A major goal of the program is to prepare students for careers as research scientists. Details of the program may be obtained from the Group office.  
**Graduate Advisers.** R. Berman *(Neurological Surgery)*, E. Diaz *(Pharmacology)*, A. Ishida *(Neuro-*

*biology, Physiology, and Behavior)*, W.M. Usrey *(Neurobiology, Physiology, and Behavior)*, B. Wiltgen *(Psychology)*

## Courses in Neuroscience (NSC)

### Upper Division

#### 160. Molecular and Cellular Neurobiology (3)

Lecture—1.5 hours; discussion—1.5 hours. Prerequisite: Neurobiology, Physiology, and Behavior 100, Biological Sciences 101 and consent of instructor. Selected topics in neurobiology. Topics include channel biophysics, action potential propagation, intracellular signal transduction pathways, synaptic physiology and quantal analysis, cellular mechanisms of synaptic plasticity, and neuromodulation of synaptic circuitry. (Same course as Neurobiology, Physiology, and Behavior 160.) GE credit: VL—S. (S.) Burns

### Graduate

#### 200LA. Laboratory Methods in Neurobiology (6)

Laboratory—18 hours. Prerequisite: graduate standing in the Neuroscience Graduate Group. Individual research in the laboratory of a faculty member. Research problems emphasize the use of contemporary methods and good experimental design. May be repeated three times for credit. (S/U grading only.)—F, W, S. (F, W, S.)

#### 200LB. Laboratory Methods in Neurobiology (3)

Laboratory—9 hours. Prerequisite: graduate standing in the Neuroscience Graduate Group. Individual research in the laboratory of a faculty member. Research problems emphasize the use of contemporary methods and good experimental design. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

#### 201. Neuroanatomy (3)

Lecture—2 hours; laboratory/discussion—1 hour. Prerequisite: consent of instructor. Limited enrollment. Mix of lectures, demonstrations, and dissections, emphasizing functional significance of neuroanatomy from a biological perspective, with comparisons between human and non-human brains. Emphasis placed on functional anatomy of the nervous system, integrated with cellular, molecular, cognitive, and developmental concepts.—F. (F.) Amaral

#### 211. Advanced Topics in Neuroimaging (2)

Seminar—2 hours. Prerequisite: Psychology 210 or consent of instructor. Restricted to 16 students. Critical presentation and discussion of the most influential advanced issues in neuroimaging, emphasizing fMRI design/analysis and the integration of fMRI with EEG/MEG. (Same course as Neurobiology, Physiology, and Behavior 211 and Psychology 211.) (S/U grading only.)—W. (W.) Miller

#### 220. How to Give a Scientific Seminar (3)

Lecture/discussion—3 hours. Prerequisite: consent of instructor. Presentation of effective seminars. Student presentations of selected neuroscience topics in seminar format. Must be taken in two consecutive quarters. Offered in alternate years.—F, S. (F, S.) DeBello, McAllister

#### 221. Cellular Neurophysiology (4)

Lecture—4.5 hours. Prerequisite: graduate standing or consent of instructor. Physiological aspects of cellular and subcellular organization of the nervous system. Neuronal cell biology, the structure and function of ion channels, electrical excitability, signaling cascades, sensory transduction and, mechanisms of synaptic transmission, and the cellular basis of learning and memory.—F. (F.) Burns, Chen

#### 222. Systems Neuroscience (5)

Lecture—4 hours; discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Integrative and information-processing aspects of nervous system organization. Topics include sensory systems, motor function, sensorimotor integration, the limbic system, and the neurobiology of learning and memory. (Same course as Neurobiology, Physiology, and Behavior 222.)—W. (W.) DeBello, Ditterich, Usrey

**Fall 2011 and on Revised General Education (GE): AH=Arts and Humanities; SE=Science and Engineering; SS=Social Sciences;**

**ACGH=American Cultures; DD=Domestic Diversity; OL=Oral Skills; QL=Quantitative; SL=Scientific; VL=Visual; WC=World Cultures; WE=Writing Experience**

**Pre-Fall 2011 General Education (GE): ArtHum=Arts and Humanities; SciEng=Science and Engineering; SocSci=Social Sciences; Div=Domestic Diversity; Wrt=Writing Experience**

**Quarter Offered:** F=Fall, W=Winter, S=Spring, Su=Summer; 2017-2018 offering in parentheses

**223. Cognitive Neuroscience (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: graduate student standing in Psychology or Neuroscience or consent of instructor. Graduate core course for neuroscience. Neurobiological bases of higher mental function including attention, memory, language. One of three in three-quarter sequence. (Same course as Psychology 261.)—S. (S.) Swaab

**224A. Molecular and Developmental Neurobiology (2)**

Lecture/discussion—2 hours. Prerequisite: consent of instructor. Key issues in developmental and molecular neurobiology. Discussion emphasis on critical evaluation of the experiments and methods described in research papers. Readings of seminal, primary research papers, reviews, and book chapters. Reading materials will be distributed one week in advance.—W. (W.) Cheng, Diaz

**224B. Molecular and Developmental Neurobiology (2)**

Lecture/discussion—2 hours. Prerequisite: course 224A or consent of instructor. Continuation of course 224A. Key issues in developmental and molecular neurobiology, focusing on developmental topics. Discussion emphasis on critical evaluation of experiments and methods described in associated literature. Offered in alternate years.—S. Cheng, Diaz

**225. Translational Research in the Neurobiology of Disease (2)**

Lecture—1 hour; discussion—1 hour. Prerequisite: Past or concurrent enrollment in Neuroscience courses 221, 222, 223, or permission of instructor; restricted to current graduate student enrollment or permission of instructor. This course will provide an overview of major neuropsychiatric and neurological disorders from both the clinical and fundamental science perspectives. Offered in alternate years.—W. Carter, McAllister

**226. Molecular and Developmental Neurobiology (4)**

Lecture/discussion—4 hours. Prerequisite: consent of instructor. Introduction to molecular and developmental neurobiology. Topics range from neurulation to development of sensory systems and include modern molecular methods and their application in developmental neuroscience.—W. (W.) McAllister

**243. Topics in Cellular and Behavioral Neurobiology (2)**

Discussion—1 hour; seminar—1 hour. Prerequisite: consent of instructor. An advanced examination of several current problems in neurobiology. Topics will vary in different years; may be repeated for credit. (S/U grading only.)—S. (S.) Ishida

**247. Topics in Functional Neurogenomics (2)**

Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing or consent of instructor. The theory, methods and principles of functional neurogenomics with emphasis on the relationship to molecular mechanisms involved in development and disease of the nervous system. (Same course as Neurobiology, Physiology, and Behavior 247.) Offered in alternate years.—W. Choudary

**250. Biology of Neuroglia (2)**

Lecture/discussion—1.5 hours. Prerequisite: consent of instructor. The properties and functions of non-neuronal or neuroglial cells in the mammalian central nervous system with relevance to neuronal development, physiology and injury response. Offered in alternate years. (S/U grading only.)—S.

**261A. Topics in Vision: Eyes and Retinal Mechanisms (2)**

Lecture/discussion—2 hours. Prerequisite: graduate standing, Neurobiology, Physiology, and Behavior 100 or 112 or the equivalent. Structure and function of the visual system, with emphasis on the eye and retina, including optics, anatomy, transduction, retinal synapses, adaptation, and parallel processing. (Same course as Neurobiology, Physiology, and Behavior 261A and Molecular, Cellular, and Integrative Physiology 261A.) (S/U grading only.) Offered in alternate years.—F. Ishida

**261B. Topics in Vision: Systems, Psychophysics, Computational Models (2)**

Lecture/discussion—2 hours. Prerequisite: consent of instructor, course 261A recommended. Functions of the central visual pathways and their underlying mechanisms. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system. (Same course as Neurobiology, Physiology, and Behavior 261B and Molecular, Cellular, and Integrative Physiology 261B.) (S/U grading only.) Offered in alternate years.—W. Britten

**261C. Topics in Vision: Clinical Vision Science (2)**

Lecture/discussion—2 hours. Prerequisite: courses 261A and 261B, or consent of instructor. Causes and mechanistic bases of major blinding diseases. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system related to disease. (Same course as Neurobiology, Physiology, and Behavior 261C and Molecular, Cellular, and Integrative Physiology 261C.) (S/U grading only.) Offered in alternate years.—S. Werner

**267. Computational Neuroscience (5)**

Lecture—4 hours; lecture/laboratory—3 hours. Prerequisite: one course in general neuroscience at the level of course 100; one year college-level Calculus at level of Math 16A, B, C; one year Physics at the level of Physics 7A, B, C, strongly recommended; students from other departments should contact the instructor. Mathematical models and data analysis techniques used to describe computations performed by nervous systems. Lecture topics include single-neuron biophysics, neural coding, network dynamics, memory, plasticity, and learning. Lab topics include programming mathematical models and data analysis techniques in MATLAB. Offered in alternate years. (Same course as Neurobiology, Physiology & Behavior 267.)—(F.) Goldman

**283. Neurobiological Literature (1)**

Seminar—1 hour. Prerequisite: consent of instructor. Critical presentation and analysis of recent journal articles in neurobiology. May be repeated for credit. (S/U grading only.)—F. W. S. (F, W, S.)

**284. Development of Sensory Systems (1)**

Seminar—1 hour. Prerequisite: consent of instructor. Presentation and discussion of recent literature on the development of sensory systems. May be repeated for credit. (S/U grading only.)—F. S. (F, S.) Cheng

**285. Literature in Visual Neuroscience (2)**

Seminar—2 hours. Critical presentation and discussion of current literature in visual neuroscience. (Same course as Neurobiology, Physiology, and Behavior 285.) May be repeated for credit if topic differs. (S/U grading only.)—F. W. S. (F, W, S.) Britten, Goldman, Usrey

**287A. Topics in Theoretical Neuroscience (2)**

Seminar—2 hours. Prerequisite: consent of instructor. In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature. May be repeated for credit. (Same course as Neurobiology, Physiology & Behavior 287A.) (S/U grading only.)—(F.) Ditterich, Goldman

**287B. Topics in Theoretical Neuroscience (2)**

Seminar—2 hours. Prerequisite: consent of instructor. In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature. May be repeated for credit. (Same Course as Neurobiology, Physiology & Behavior 287B.) (S/U grading only.)—S. (S.) Ditterich, Goldman

**289. Topics in Molecular and Developmental Neurobiology (2)**

Seminar—2 hours. Analysis and discussion of seminal and current research papers in molecular and developmental neurobiology. Different topics will be covered each quarter. In the past topics have included, "Synaptic vesicle dynamics," "Neuronal polarity," and "Glutamate receptors." May be repeated ten times for credit when topic differs. (S/U grading only.)—F. S. (F, S.) Diaz, Zito

**290C. Research Conference in Neurobiology (1)**

Discussion—1 hour. Prerequisite: graduate standing in Neuroscience or consent of instructor; course 299 (concurrently). Presentation and discussion of faculty and graduate student research in neurobiology. May be repeated for credit. (S/U grading only.)—F. W. S. (F, W, S.)

**292. Cortical Plasticity and Perception (2)**

Lecture/discussion—2 hours. Prerequisite: Neurobiology, Physiology, and Behavior 100 or 112 or equivalent or consent of instructor. Examination of research articles on cortical plasticity and changes in perception. Examples drawn from studies of the somatosensory, visual, auditory, and motor cortex. Offered in alternate years. (S/U grading only.)—(W.)

**298. Group Study (1-5)**

(S/U grading only.)

**299. Research (1-12)**

(S/U grading only.)

## Neurology

**See Medicine, School of, on page 427.**

## Neurosurgery

**See Medicine, School of, on page 427.**

## Nursing, Betty Irene Moore School of

Heather M. Young, Ph.D., R.N., F.A.A.N.; Associate Vice Chancellor for Nursing, UC Davis, and Dean, Betty Irene Moore School of Nursing

Theresa A. Harvath, Ph.D., R.N., F.A.A.N.; Associate Dean for Academics, Director for Clinical Education and Clinical Professor

Jill G. Joseph, M.D., Ph.D., M.P.H.; Associate Dean for Research and Professor

4610 X St., Suite 4202  
Sacramento, CA 95817  
916-734-2145; <http://nursing.ucdavis.edu>

**Mission Statement**

The Betty Irene Moore School of Nursing at UC Davis cultivates academic excellence through immersive, interprofessional and interdisciplinary education and research in partnership with the communities served. Faculty, staff and students discover and disseminate knowledge to advance health, improve quality of care and shape policy.

## Nursing Science and Health-Care Leadership Graduate Degree Program

Hosted by the Betty Irene Moore School of Nursing at UC Davis, the Nursing Science and Health-Care Leadership Graduate Degree Programs prepare nurse leaders, physician assistants, nurse practitioners, researchers and faculty in a unique interdisciplinary and interprofessional environment. The full-time, academic, doctoral program prepares gradu-

ates as leaders in health care, health policy and nurse faculty/researchers at the university level. The master's-degree Physician Assistant Studies program prepares graduates to deliver care as physician assistants. Graduates of the professional master's-degree leadership program are prepared for healthcare leadership roles in a variety of organizations and as nurse faculty at the community college and prelicensure education levels. Graduates of the master's-degree Nurse Practitioner Program are prepared to deliver care as nurse practitioners.

## Faculty

The UC Davis Nursing Science and Health-Care Leadership Graduate Group includes a wide cross-section of academic disciplines with faculty from the Betty Irene Moore School of Nursing as well as UC Davis Health System and other UC Davis schools, colleges and departments. Within the graduate group faculty are experts in nursing, medicine, health informatics, nutrition, biostatistics, public health and other fields. For a complete list of faculty, see <http://nursing.ucdavis.edu>.

## Courses in Nursing (NRS)

Doctoral and master's-degree leadership core courses are listed below.

**Core Courses.** For a current listing of courses offered through the School of Nursing, please see <http://nursing.ucdavis.edu>.

## Graduate

### 201. Health Status and Care Systems (4)

Lecture/discussion—3 hours; laboratory/discussion; project. Prerequisite: current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Comparative health status data, major current health issues globally, nationally, regionally. Theoretical perspectives on social, political, economic determinants of health. Health-care systems examined, linked to data, and evaluated in regards to outcomes. Aging, rural, ethnic minority populations highlighted. —F. (F.)

### 202. Implementation Science (4)

Lecture/discussion—4 hours. Prerequisite: current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Change processes in health care from political, historic, economic and sociologic frameworks. Historic and current examples of transformative change in the health-care system. Skills for system transformation through health policy, practice, research and education are emphasized. —S. (S.)

### 203. Leadership in Health Care (4)

Lecture/discussion—3 hours; fieldwork. Prerequisite: current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Critical examination of leadership from a variety of theoretical and philosophical perspectives and focuses on specific challenges in health care and leadership at various levels, e.g., patient, organizational, and policy levels. —W. (W.)

### 204. Research Skills for Nursing Science and Health-Care Leadership (4)

Lecture/discussion—3 hours; laboratory/discussion—1 hour. Prerequisite: current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Foundation for analyzing research, health, and systems data to answer clinical, systems, or policy questions. Use and examine multiple sources of data and information as a basis for planned change and transformation in health care. —F. (F.)

### 205. Research Design in Nursing and Health Care (4)

Lecture/discussion—4 hours. Prerequisite: current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Major types of quantitative and qualitative research design and their application to nursing and health-care research. Implications of choosing alternative research designs and critical analysis of philo-

sophical underpinnings. Evaluation of control and validity, sampling, instruments to measure health concepts. —W. (W.)

### 205A. Overview of Research in Nursing Science and Health Care (2)

Lecture—2 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Provides an overview of quantitative and qualitative paradigms in scientific inquiry and the major designs related to each paradigm. First of a three-course series on research design and methods in nursing science and healthcare research. —F. (F.)

### 205B. Quantitative Research in Nursing Science and Health Care (4)

Lecture—4 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Introduces principles of quantitative data collection and analysis as applied to major study designs in nursing and health-care research. Provides a basic foundation for producing, interpreting, and applying quantitative research findings to answer clinical, system, and policy questions. —W. (W.)

### 205C. Qualitative Research in Nursing Science and Health Care (4)

Lecture—4 hours. Prerequisite: consent of instructor. Restricted to current Ph.D. students in NSHL program or consent of instructor. Introduces principles of qualitative data collection and analysis as applied to major study designs in nursing and health-care research. Provides a basic foundation for producing, interpreting, and applying qualitative research findings to answer clinical, system, and policy questions. —S. (S.)

### 206. Community Connections (2-5)

Prerequisite: current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Open to NSHL MS students only. Community-based learning and experiences including community participation, assessment, data collection and analysis using multiple approaches, community health improvement projects, collaborative leadership practice, all with the guidance of community members and nursing faculty. May be repeated for credit. —F, W, S. (F, W, S.)

### 210Y. Applied Health Informatics (4)

Lecture/discussion—1 hour; web virtual lecture—3 hours. Prerequisite: consent of instructor. Open to current student in NSHL graduate programs or consent of instructor. Within the conceptual framework of the Foundation of Knowledge model, this course integrates nursing science, information science, computer science and cognitive science to acquire, process, generate and disseminate knowledge. —W. (W.)

### 211Y. Rural Health (2-3)

Lecture/discussion—2 hours; fieldwork. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Interprofessional graduate course provides an introduction to rural health theory, research, policy, and practice, with an emphasis on rural health assets and disparities. —F. (F.)

### 220. Social, Cultural, and Behavioral Determinants of Health (2)

Lecture/discussion—2 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Effects of globalization, political systems, local and global economies, culture, race, class, gender, and sexuality on population health. —Su. (Su.)

### 221. Biophysical Concepts in Nursing (3)

Lecture/discussion—3 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Pathophysiological processes that contribute to different disease

states across the lifespan; case studies; selective clinical decisions using current, reliable sources of pathophysiology information. —Su. (Su.)

### 242A. Implementation Science for Clinicians (2)

Lecture/discussion—2 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course focuses on identification of relevant research or improvement questions specific to patient care and evaluating the pertinent research literature related to the implementation of evidence based care. The course is 1st of a 3-course series. —F. (F.)

### 242B. Implementation Science for Clinicians (2)

Lecture/discussion—2 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course is a continuation of course 242A, Implementation Science for Clinicians, with a focus on implementing and evaluating a change. —W. (W.)

### 242C. Implementation Science for Clinicians (2)

Lecture/discussion—2 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Advanced skills in application of implementation science into systems based practice and incorporating quality improvement and patient safety knowledge with particular focus on prevention of medical errors. —S. (S.)

### 243A. Leadership in Professional Practice (2)

Lecture/discussion—2 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course is a critical examination of leadership using theoretical and philosophical perspectives with an applied approach applicable to clinical practice. The 3 course series is conducted across three quarters in the 1st, 3rd and 8th quarters. —Su. (Su.)

### 243B. Leadership in Professional Practice (1)

Lecture/discussion—1 hour. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces professional role topics including history of the profession, the role in interprofessional teams and the health care system, transitioning to the role from other health professions, scope of practice, certification and licensure and professional organizations. —W. (W.)

### 243C. Leadership in Professional Practice (1)

Lecture/discussion—1 hour. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course expands upon the leadership role as it relates to their clinical practice and professional role. Professional role topics including: transitioning from student to practicing professional, scope of practice, the physician relationship, and more advanced concepts in ethics. —S. (S.)

### 250. Foundations of Primary Health Care (7)

Lecture/discussion—6 hours; laboratory—3 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course is designed to promote the understanding and clinical application of human anatomy, physiology, histology, immunology and pathology. —Su. (Su.)

### 251A. Primary Health Care (8)

Lecture/discussion—8 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate

Degree programs or by consent of instructor. Course introduces primary health care concepts essential to the care of common medical problems seen in primary care settings. Module content will focus on various organ systems and specialty areas. —F. (F.)

### **251B. Foundations of Primary Health Care (8)**

Lecture/discussion—8 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces primary health care concepts essential to the care of common medical problems seen in primary care settings. —W. (W.)

### **251C. Primary Health Care (8)**

Lecture/discussion—8 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces primary health care concepts essential to the care of common medical problems seen in primary care settings. —S. (S.)

### **251D. Primary Health Care (6)**

Lecture/discussion—6 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces primary health care concepts essential to the care of common medical problems seen in primary care settings. —Su. (Su.)

### **260. Foundations of Behavioral Health (1)**

Lecture/discussion—1 hour. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course focuses on the spectrum of normal psychological development over the lifespan for children, adults and elders. Theories of stress and coping mechanism are presented as a framework for the assessment of individuals. —Su. (Su.)

### **270. Foundations of Pharmacology (2)**

Lecture/discussion—1 hour; laboratory—3 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Course introduces the student to the major concepts in pharmacology and relevant human physiology related to pharmacotherapeutics and toxicology. —Su. (Su.)

### **271A. Pharmacology (2)**

Lecture/discussion—1 hour; laboratory—3 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Systems based pharmacology focused on classes of drugs used to treat disorders in specialty systems. —F. (F.)

### **271B. Pharmacology (2)**

Lecture/discussion—1 hour; laboratory—3 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Systems based pharmacology focused on classes of drugs used to treat disorders in specialty systems. —W. (W.)

### **271C. Pharmacology (2)**

Lecture/discussion—1 hour; laboratory—3 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Systems based pharmacology focused on classes of drugs used to treat disorders in specialty systems. —S. (S.)

### **272. Foundations of Pharmacology (2)**

Lecture/discussion—2 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Theoretical background to providing safe and effective care related to drugs and natural products. —Su. (Su.)

### **273. Pharmacology Concepts in Nursing (2)**

Lecture/discussion—2 hours. Prerequisite: courses 221, 272, 420, 421; consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Application of principles for safe and effective use of medications and natural products; use of current, reliable information to make clinical decisions. —F. (F.)

### **290. Master's Seminar (2)**

Discussion—2 hours. Prerequisite: current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Open to NSHL MS students only or by consent of course instructor. Subject varies from quarter to quarter. Current knowledge and issues relevant to one of two fields of emphasis: population health or health systems. May be repeated 10 times for credit. —F, W, S. (F, W, S.)

### **291. Doctoral Seminar (2)**

Discussion—2 hours. Prerequisite: current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Focus on the theory, research and knowledge relevant to one of two fields of emphasis: population health or health systems. Emphasis placed on reading, critique and synthesis of classic and cutting-edge research in nursing and health care. May be repeated 10 times for credit. —F, W, S. (F, W, S.)

### **291D. Doctoral Seminar (2)**

Discussion—2 hours. Prerequisite: current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Focus on the theory, research and knowledge relevant to one of two fields of emphasis: population health or health systems. Emphasis placed on reading, critique and synthesis of classic and cutting-edge research in nursing and health care. May be repeated 10 times for credit. —F, W, S. (F, W, S.)

### **298. Special Topics in Nursing Science and Health-Care Leadership (1-4)**

Lecture/discussion—1-2 hours. Prerequisite: current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. In-depth study of topics in Nursing Science and Health-Care Leadership, selected from: policy and politics in health care, health-care disparities, current issues in health care, approaches to the conduct of science, or other related areas, with year to year variation. May be repeated for credit. Offered irregularly. —F, W, S. (F, W, S.)

### **298V. Online Special Topics in Nursing Science and Health-Care Leadership (1-4)**

Web virtual lecture—1-4 hours; web electronic discussion—1-4 hours. Prerequisite: current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. In-depth study of topics in Nursing Science and Health-Care Leadership, selected from: policy and politics in health care, health-care disparities, current issues in health care, approaches to the conduct of science, or other related areas, with year to year variation. May be repeated for credit. Offered irregularly. —F, W, S. (F, W, S.)

### **299. Research and Writing (1-12)**

Extensive writing or discussion—3-36 hours. Prerequisite: consent of instructor. Students in the Nursing Science and Health-Care Leadership graduate programs conduct research and writing under the supervision of a faculty member. May be repeated for credit. (S/U grading only.) —F, W, S, Su. (F, W, S, Su.)

### **299D. Dissertation Research and Writing (1-12)**

Extensive writing or discussion—3-36 hours. Prerequisite: consent of instructor. Students in the Nursing Science and Health-Care Leadership graduate programs conduct dissertation research and writing under the supervision of a faculty member. May be repeated for credit. (S/U grading only.) —F, W, S. (F, W, S.)

### **Professional**

#### **301. Learner Centered Teaching (3-4)**

Lecture/discussion—3 hours; practice—1 hour. Open to current students in the Nursing Science and Health-Care Leadership graduate programs; outside students with prior educational or work experience in education may register for this class with the consent of instructor. Students will explore best practices in learner-centered teaching, performance-based curriculum models, instructional design, and assessing/evaluating student learning. Students will have experience in planning learner-centered activities that are engaging and effective in achieving desired student performance. —W, S. (W, S.)

#### **302. Teaching Methods—Use of Emerging Technologies to Improve Student Learning (4)**

Lecture/discussion—3 hours; practice—1 hour. Open to current students in the Nursing Science and Health-Care Leadership graduate programs; outside students with prior educational or work experience in education may register for this class with the consent of instructor. Students will examine, design and develop instructional strategies that use innovative and emerging technologies to promote motivation, performance and learning in health professions education. Research findings associated with use of various emerging technologies will be examined. —F, S. (F, S.)

#### **303. Professional Role Formation (2-4)**

Lecture/discussion—2 hours; Laboratory—2 hours. Exploration of the educator role. Open to current students in the Nursing Science and Health-Care Leadership graduate programs; outside students with prior educational or work experience in education may register for this class with the consent of instructor. Exploration of the educator role. Topics include Role Expectations, Legal and Regulatory Issues, Professional Ethics, Educational Scholarship, Individual Differences, Learning Environments, and Lifelong Learning. Placements for the optional practicum are arranged in a wide variety of settings. —F, W. (F, W.)

### **Professional**

#### **400. Basic Clinical Skills (1-4)**

Lecture/laboratory—1-4 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Instruction and practice of the fundamental clinical skills necessary for patient care comprise this course with a primary focus on principles of effective communication in establishing the therapeutic provider-patient relationship. —Su. (Su.)

#### **401. Basic Clinical Skills (1-4)**

Lecture/laboratory—1-4 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content. —F, W, S, Su. (F, W, S, Su.)

#### **410A. Advanced Clinical Skills (1-4)**

Lecture/laboratory—1-4 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content. —F. (F.)

#### **410B. Advanced Clinical Skills (1-4)**

Lecture/laboratory—1-4 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related specified systems. —W. (W.)

#### **410C. Advanced Clinical Skills (1-4)**

Lecture/laboratory—1-4 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor.

Continuation of focus on history taking and physical examination skills with advanced/specialized content related specified systems.—S. (S.)

#### **410D. Advanced Clinical Skills (1-4)**

Lecture/laboratory—1-4 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related specified systems.—Su. (Su.)

#### **410E. Advanced Clinical Skills (1-4)**

Lecture/laboratory—1-4 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related specified systems.—F. (F.)

#### **410F. Advanced Clinical Skills (1-4)**

Lecture/laboratory—1-4 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related specified systems.—W. (W.)

#### **410G. Advanced Clinical Skills (1-4)**

Lecture/laboratory—1-4 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified specialty systems.—S. (S.)

#### **420. Foundations of Clinical Nursing Practice (3)**

Clinical activity—9 hours. Prerequisite: consent of the instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Foundational course introduces students to core concepts of clinical nursing, including clinical reasoning, professional ethics, therapeutic communication and activities of daily living. Develop skills for the provision of safe, high quality, culturally-sensitive, person-centered care across the lifespan.—Su. (Su.)

#### **421. Health Assessment Across the Lifespan (3)**

Lecture/discussion—1 hour; clinical activity—6 hours. Prerequisite: consent of the instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Prepares students to conduct a health history assessment using developmentally and culturally appropriate approaches for individuals across the lifespan. Acquire the knowledge, understanding, and skills needed to perform, interpret and communicate a health history.—Su. (Su.)

#### **422. Care of Adults with Chronic Conditions (6)**

Lecture/discussion—3 hours; clinical activity—9 hours. Prerequisite: courses 221, 272, 420, and 421; consent of the instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Learn concepts central to the effective management of a variety of common chronic illness and disabling conditions across the lifespan in a variety of different settings. Practice conducting in-depth health assessments of individuals with chronic conditions.—F. (F.)

#### **423. Psychosocial Wellness & Illness (5)**

Lecture/discussion—3 hours; clinical activity—6 hours. Prerequisite: courses 221, 272, 420, and 421; consent of the instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Explore the biological, psychological, cultural, societal, and environmental factors that affect psychological wellness and illness. Practice provid-

ing care to individuals and families experiencing disruptions in mental health secondary to physical or psychiatric illness, trauma or loss.—F. (F.)

#### **424. Nursing Care of Older Adults (3)**

Lecture/discussion—2 hours; clinical activity—3 hours. Prerequisite: courses 221, 272, 420, 421, 273, 422, 423, 425, 223, and 426; consent of the instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Build skills for situations involving older adults, such as in the management of complex clinical and administering and interpreting standardized assessment tools. Develop plans of care for older adults experiencing a variety of geriatric syndromes.—Su. (Su.)

#### **425. Family Focused Nursing (9)**

Lecture/discussion—5 hours; clinical activity—12 hours. Prerequisite: courses 221, 272, 420, 421, 273, 422, and 423; consent of the instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Focuses on family as the unit of nursing and interprofessional care. Includes influences of family on health and illness, reproductive and gender/sexuality issues, pregnancy, birth and child-rearing, and the health and illness in children and youth.—W. (W.)

#### **426. Nursing Care of Adults with Complex Illness or Injury (8)**

Lecture/discussion—4 hours; clinical activity—12 hours. Prerequisite: courses 221, 272, 420, 421, 273, 422, 423 and 425; consent of the instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Prepares students to provide comprehensive, patient-centered nursing care for patients with acute or complex illness and injury. Theory portion focuses on concepts associated with complex physiological alterations.—S. (S.)

#### **427. Fostering Healthy Communities (7)**

Lecture/discussion—4 hours; clinical activity—9 hours. Prerequisite: consent of the instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Focuses on populations & communities, and emphasizes working with diverse communities in providing health promotion, chronic disease management, transitional support and crisis intervention. Develop skills to critically analyze and shape health policy and develop accessible community resources.—Su. (Su.)

#### **428. Capstone Clinical Nursing Practicum (8)**

Clinical activity—24 hours. Prerequisite: courses 220, 221, 222A, 272, 420, 421, 429A, 222B, 273, 422, 423, 429B, 203, 212, 425, 429C, 202, 223, 426, 429D, 224, 424, 427, and 429E; consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Practicum experience is designed to facilitate transition to professional practice. Opportunity to choose a clinical practice area of interest and to work with a preceptor with expertise in that area.—F. (F.)

#### **429A. Collaborative Practice A (1)**

Clinical activity—3 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism.—Su. (Su.)

#### **429B. Collaborative Practice B (1)**

Clinical activity—3 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies.

Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism.—F. (F.)

#### **429C. Collaborative Practice C (1)**

Clinical activity—3 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism.—W. (W.)

#### **429D. Collaborative Practice D (1)**

Clinical activity—3 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism.—S. (S.)

#### **429E. Collaborative Practice E (1)**

Clinical activity—3 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism.—S. (S.)

#### **429F. Collaborative Practice F (1)**

Clinical activity—3 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Group or by consent of the instructor. Interprofessional course uses experiential learning activities including simulation, role play, and case studies. Concepts include but are not limited to; communication, person-centered care, ethical decision making, end-of-life decisions, culturally appropriate care, quality and safety, social justice, and professionalism.—F. (F.)

#### **440. Preparation for Clinical Practice (1-3)**

Clinical Activity—3-9 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Students are placed in clinical settings and/or clinical simulation laboratories to observe and practice the integration of clinical skills with direct supervision by faculty.—S. (S.)

#### **450A. Supervised Clinical Practice-Primary Health Care (1-16)**

Clinical activity—48 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated five times for credit.—F, W, S, Su. (F, W, S, Su.)

#### **450B. Supervised Clinical Practice-Primary Health Care (1-16)**

Clinical activity—48 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate com-

munity-based primary care provider per accreditation requirements. May be repeated five times for credit.—F, W, S, Su. (F, W, S, Su.)

#### **450C. Supervised Clinical Practice-Primary Health Care (1-16)**

Clinical activity—48 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated five times for credit.—F, W, S, Su. (F, W, S, Su.)

#### **450D. Supervised Clinical Practice-Primary Health Care (1-16)**

Clinical activity—48 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated five times for credit.—F, W, S, Su. (F, W, S, Su.)

#### **450E. Supervised Clinical Practice-Primary Health Care (1-16)**

Clinical activity—48 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Each of the required primary care rotations is a four-week supervised clinical practice experience in primary care, under the supervision of an appropriate community-based primary care provider per accreditation requirements. May be repeated five times for credit.—F, W, S, Su. (F, W, S, Su.)

#### **451. Supervised Clinical Practice-Pediatrics (1-16)**

Clinical activity—48 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate community-based Pediatric Medicine provider per accreditation requirements. May be repeated five times for credit.—F, W, S, Su. (F, W, S, Su.)

#### **452. Supervised Clinical Practice-Women's Health (1-16)**

Clinical activity—48 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate community-based women's health and prenatal care provider per accreditation requirements. May be repeated five times for credit.—F, W, S, Su. (F, W, S, Su.)

#### **453. Supervised Clinical Practice-Mental Health (1-16)**

Clinical activity—48 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate community-based psychiatrist, psychiatric/mental health provider per accreditation requirements. May be repeated five times for credit.—F, W, S, Su. (F, W, S, Su.)

#### **454. Supervised Clinical Practice-Emergency Medicine (1-16)**

Clinical activity—48 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate Emergency Medicine provider per accreditation requirements. May be repeated five times for credit.—F, W, S, Su. (F, W, S, Su.)

#### **455. Supervised Clinical Practice-Inpatient Surgery (1-16)**

Clinical activity—48 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical experience under the supervision of an appropriate surgical provider per accreditation requirements. May be repeated five times for credit.—F, W, S, Su. (F, W, S, Su.)

#### **456. Supervised Clinical Practice-Inpatient Medicine (1-16)**

Clinical activity—48 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate inpatient provider per accreditation requirements. May be repeated five times for credit.—F, W, S, Su. (F, W, S, Su.)

#### **459. Supervised Clinical Practice-Other Specialties (1-16)**

Clinical activity—48 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Two four-week selective rotations are available to accommodate student interest and/or accommodate a student's clinical deficits identified by the program. May be repeated five times for credit.—F, W, S, Su. (F, W, S, Su.)

#### **470. Health Care Ethics (3-9)**

Lecture/discussion—2 hours; laboratory/discussion—1 hour. Prerequisite: consent of instructor. Guided independent study of issues in biomedical ethics, with discussion of readings that are based on student interests and needs. Participation in ethics rounds. (Same course as General Medicine 470.) (S/U grading only.)—F, W, S, Su. (F, W, S, Su.) Loewy

#### **471. Supervised Clinical Practice-Geriatrics (1-16)**

Clinical activity—48 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Four-week clinical rotation under the supervision of an appropriate community-based Geriatric Medicine provider per accreditation requirements. May be repeated five times for credit.—F, W, S, Su. (F, W, S, Su.)

#### **475. Supervised Clinical Practice-Acute Care (1-16)**

Clinical activity—48 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Two-to-four-week rotation focus on providing acute care in inpatient settings. Students will work directly with specific inpatient units. May be repeated five times for credit.—F, W, S, Su. (F, W, S, Su.)

#### **480. Supervised Clinical Practice-Rural Health (1-16)**

Clinical activity—48 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Rural health rotations focus on providing care in medically underserved rural sites. Students will experience care across the continuum in ambulatory, inpatient, and community based settings. May be repeated five times for credit.—F, W, S, Su. (F, W, S, Su.)

#### **490. Supervised Clinical Practice-Quality and Safety (1-16)**

Clinical activity—48 hours. Prerequisite: consent of instructor. Open to graduate students in the Nursing Science and Health-Care Leadership Graduate Degree programs or by consent of instructor. Clinical rotation that allow students to work directly with patient safety and quality improvement committees in a various organizations. May be repeated five times for credit.—F, W, S, Su. (F, W, S, Su.)

#### **493A. Improving Quality in Health Care (4)**

Lecture/discussion—4 hours. Open to Nursing Science and Health-Care Leadership Students and/or consent of instructor. Working in interdisciplinary teams, will explore the theory and practical methods being employed to make improvement in health care systems while providing an opportunity for interprofessional educational experience. (S/U grading only; deferred grading only, pending completion of sequence.)—F. (F.)

#### **493B. Improving Quality in Health Care (4)**

Lecture/discussion—4 hours. Open to Nursing Science and Health-Care Leadership Students and/or consent of instructor. Working in interdisciplinary teams, will explore advanced theory and practical methods being employed to make improvement in health care systems while providing an opportunity for interprofessional educational experience (S/U grading only; deferred grading only, pending completion of sequence.)—W. (W.)

#### **493C. Enhancing Patient Safety in Health Care (3)**

Seminar—1 hour; clinical activity—1 hour; discussion—1 hour. Prerequisite: Nursing Science and Health-Care Leadership graduate students; consent of instructor. Inter-professional module is designed to explore the theory and practical methods being employed to improve patient safety in health care while providing an opportunity for inter-professional educational experience. (Same course as Medical Sciences 493QC.) (S/U grading only.)—S. (S.)

### **Courses in Physicians Assistant Studies (PAS)**

#### **Graduate**

#### **299. Research and Writing (1-4)**

Extensive writing or discussion—3-12 hours. Prerequisite: consent of instructor. Open to Graduate Students in the Nursing Science and Health-Care Leadership Graduate Degree programs, or by consent of instructor. Students in the Nursing Science and Health-Care Leadership graduate programs conduct research and writing under the supervision of a faculty member. Students may repeat this course for credit in different quarters, depending on the length of their program of study to complete their Master's Degree. (S/U grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **Professional**

#### **400. Basic Clinical Skills (1-4)**

Lecture/laboratory—1-4 hours. Prerequisite: consent of instructor. Open to Graduate Students in the Nursing Science and Health-Care Leadership Graduate Degree programs, or by consent of instructor. Instruction and practice of the fundamental clinical skills necessary for patient care comprise this course with a primary focus on principles of effective communication in establishing the therapeutic provider-patient relationship.—Su. (Su.)

#### **401. Basic Clinical Skills (1-4)**

Lecture/discussion—1-4 hours. Prerequisite: consent of instructor. Open to Graduate Students in the Nursing Science and Health-Care Leadership Graduate Degree programs, or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content.—F, W, S, Su. (F, W, S, Su.)

#### **410A. Advanced Clinical Skills (1-4)**

Lecture/laboratory—1-4 hours. Prerequisite: consent of instructor. Open to Graduate Students in the Nursing Science and Health-Care Leadership Graduate Degree programs, or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content.—F. (F.)

#### **410B. Advanced Clinical Skills (1-4)**

Lecture/laboratory—1-4 hours. Prerequisite: consent of instructor. Open to Graduate Students in the Nursing Science and Health-Care Leadership Graduate Degree programs, or by consent of instructor.

Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified systems. —W. (W.)

#### **410C. Advanced Clinical Skills (1-4)**

Lecture/laboratory—1-4 hours. Prerequisite: consent of instructor. Open to Graduate Students in the Nursing Science and Health-Care Leadership Graduate Degree programs, or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified systems. —S. (S.)

#### **410D. Advanced Clinical Skills (1-4)**

Lecture/laboratory—1-4 hours. Prerequisite: consent of instructor. Open to Graduate Students in the Nursing Science and Health-Care Leadership Graduate Degree programs, or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified systems. —Su. (Su.)

#### **410E. Advanced Clinical Skills (1-4)**

Lecture/laboratory—1-4 hours. Prerequisite: consent of instructor. Open to Graduate Students in the Nursing Science and Health-Care Leadership Graduate Degree programs, or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified systems. —F. (F.)

#### **410F. Advanced Clinical Skills (1-4)**

Lecture/laboratory—1-4 hours. Prerequisite: consent of instructor. Open to Graduate Students in the Nursing Science and Health-Care Leadership Graduate Degree programs, or by consent of instructor. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified systems. —W. (W.)

#### **410G. Advanced Clinical Skills (1-4)**

Lecture/laboratory—1-4 hours. Prerequisite: consent of instructor. Open to Graduate Students in the Nursing Science and Health-Care Leadership Graduate Degree programs. Continuation of focus on history taking and physical examination skills with advanced/specialized content related to specified systems. —F, W, S, Su. (F, W, S, Su.)

#### **440. Preparation for Clinical Practice (1-3)**

Clinical activity—36 hours. Prerequisite: consent of instructor. Open to Graduate Students in the Nursing Science and Health-Care Leadership Graduate Degree programs, or by consent of instructor. Students are placed in clinical settings and/or clinical simulation laboratories to observe and practice the integration of clinical skills with direct supervision by faculty. —S. (S.)

## Nutrition

See **Clinical Nutrition**, on page 216; **Food Service Management**, on page 342; **Nutrition; Nutritional Biology (A Graduate Group)**, on page 493; **Nutrition Science**, on page 494.

## Nutrition

(College of Agricultural and Environmental Sciences)

Francene M. Steinberg, Ph.D., RD., Chair of the Department

Sheri Zidenberg-Cherr, Ph.D., Vice Chairperson of the Department

**Department Office.** 3135 Meyer Hall  
530-752-4630; <http://nutrition.ucdavis.edu>

#### **Faculty**

Elizabeth Applegate, Ph.D., Senior Lecturer (SOE)  
Academic Senate Distinguished Teaching Award

Gary Cherr, Ph.D., Professor  
(*Nutrition, Environmental Toxicology*)

Kathryn G. Dewey, Ph.D., Distinguished Professor

Nilesh W. Gaikwad, Ph.D., Associate Professor  
(*Nutrition, Environmental Toxicology*)  
Fawaz G. Haj, Ph.D., Professor  
(*Nutrition, Internal Medicine*)  
Carl L. Keen, Ph.D., Distinguished Professor  
(*Nutrition, Internal Medicine*)  
Bo L. Lönnedal, Ph.D., Distinguished Professor  
(*Nutrition, Internal Medicine*)  
Patricia Oteiza, Ph.D., Professor  
(*Nutrition, Environmental Toxicology*)  
Carolyn M. Slusky, Ph.D., Professor  
(*Nutrition, Food Science & Technology*)  
Francene M. Steinberg, Ph.D., R.D., Professor and Chair  
Christine Stewart, Ph.D., Assistant Professor  
Angela Zivkovic, Ph.D., Assistant Professor

#### **Emeriti Faculty**

Lindsay H. Allen, Ph.D., Professor Emerita  
Kenneth H. Brown, M.D., Professor Emeritus  
Andrew J. Clifford, Ph.D., Professor Emeritus  
Louis E. Grivetti, Ph.D., Professor Emeritus  
Lucia Kaiser, Ph.D., Specialist in Cooperative Extension Emerita  
Janet King, Ph.D., Professor Emerita  
Roger B. McDonald, Ph.D., Professor Emeritus  
Robert B. Rucker, Ph.D., Professor Emeritus  
Barbara O. Schneeman, Ph.D., Professor Emerita  
Judith S. Stern, Ph.D., R.D., Professor Emerita

#### **Affiliated Faculty**

Sean Adams, Ph.D., Associate Adjunct Professor  
Ellen Bonnel, Ph.D., Academic Administrator  
Betty Burri, Ph.D., Adjunct Professor  
Britt Burton-Freeman, Ph.D., Associate Research Nutritionist  
Joan Frank, M.S., R.D., Academic Coordinator, Lecturer  
Ellen Fung, Ph.D., R.D., Associate Adjunct Professor  
Robert M. Hackman, Ph.D., Research Nutritionist  
Marjorie Haskell, Ph.D., Associate Researcher  
Peter Havel, Ph.D., D.V.M., Professor  
Wayne Hawkes, Ph.D., Assistant Adjunct Professor  
M. Jane Heinig, Ph.D., Academic Administrator  
Sonja Hess, Ph.D., Associate Research Nutritionist  
Liping Huang, Ph.D., Adjunct Professor  
Daniel Hwang, Ph.D., Adjunct Professor  
Nancy Keim, Ph.D., Adjunct Professor  
Darshan Kelley, Ph.D., Adjunct Professor  
Kevin Laufer, Ph.D., Associate Adjunct Professor  
Louise Lanoue, Ph.D., Associate Project Scientist  
Roy Martin, Ph.D., Adjunct Professor  
John Newman, Ph.D., Associate Adjunct Professor  
Charles Stephensen, Ph.D., Adjunct Professor  
Marilyn S. Townsend, Ph.D., R.D., Specialist in Cooperative Extension  
Janet Uriu-Adams, Ph.D., Associate Research Nutritionist  
Marta Van Loan, Ph.D., Adjunct Professor  
Sheri Zidenberg-Cherr, Ph.D., Specialist in Cooperative Extension  
Susan Zunino, Ph.D., Associate Adjunct Professor

**Major Programs.** See the majors in **Clinical Nutrition**, on page 216 and **Nutrition Science**, on page 494.

#### **Minor Program Requirements:**

The Department of Nutrition offers four minor programs open to students majoring in other disciplines who wish to complement their study programs with a concentration in the area of food and nutrition.

Note: If the student's major program requires the same course in biochemistry and physiology, only one of the courses may duplicate credit toward the minor. Each program below lists replacement courses to fulfill the minimum unit requirement.

UNITS

#### **Community Nutrition ..... 20**

**Preparation.** Plan in advance to include the required course prerequisites.  
Nutrition 111AY and 111B ..... 5  
Nutrition 118, 192 (2 units) ..... 6  
Nutrition 120AN or 120BN ..... 4

Neurobiology, Physiology, and Behavior  
101 ..... 5  
Replacement courses; see note above:  
Nutrition 114, 116A-116B, 116AL-116BL.

#### **Food Service Management ..... 25**

**Preparation.** Plan in advance to include the required course prerequisites.  
Food Science and Technology 100A-100B, 101A-101B ..... 12  
Food Service Management 120, 120L, 122 ..... 9  
Agricultural and Resource Economics 112 ..... 4  
Replacement courses; see note above:  
Nutrition 10, 111AY, 111B, 114, 116A-116B, 120AN, or 120BN, Economics 1A-1B.

#### **Nutrition and Food ..... 22**

**Preparation.** Plan in advance to include the required course prerequisites.  
Nutrition 111AY and 111B ..... 5  
Nutrition 120AN or 120BN ..... 4  
Food Science and Technology 100A, 100B ..... 8  
Neurobiology, Physiology, and Behavior 101 ..... 5  
Replacement courses; see note above:  
Nutrition 114, 116A-116B, 116AL-116BL.

#### **Nutrition Science ..... 20**

**Preparation.** Plan in advance to include the required course prerequisites.  
Animal Biology 102 and 103, Biological Sciences 102 and 103 and Nutrition 111AY and 111B ..... 11-15  
Neurobiology, Physiology, and Behavior 101 ..... 5  
Replacement courses; see note above:  
Nutrition 114, 115, 116A-116B, 117, 120AN or 120BN, 122, 123, 124, 201, 204.

**Minor Adviser.** 3202 Meyer Hall 530-752-2512

**Graduate Study.** Programs of study leading to the M.S. and Ph.D. degrees are available in Nutrition. For information on graduate study contact the Nutrition Graduate Group.

## Courses in Nutrition (NUT)

### Lower Division

#### **10. Discoveries and Concepts in Nutrition (3)**

Lecture—3 hours. Nutrition as a science; historical development of nutrition concepts; properties of nutrients and foods. Not open for credit to students who have taken an upper division course in nutrition. GE credit: SciEng | SE, SL.—F, W, S, Su. (F, W, S, Su.) Applegate

#### **11. Current Topics and Controversies in Nutrition (2)**

Discussion—1.5 hours; term paper. Exploration of current applications and controversies in nutrition. Students read scientific journal articles and write summaries, as well as give brief oral presentations. Topics change to reflect current interests and issues. GE credit: SciEng, Wrt | OL, SE, WE.—F, W, S, Su. (F, W, S, Su.)

#### **99. Individual Study for Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

### Upper Division

#### **104. Environmental & Nutritional Factors in Cellular Regulation and Nutritional Toxicants (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 101; Biological Sciences 103 or Animal Biology 103. Cellular regulation from nutritional/toxicological perspective. Emphasis: role of biofactors on modulation of signal transduction pathways, role of specific organelles in organization/regulation of metabolic transformations, major cofactor functions, principles of pharmacology/toxicology

important to understanding nutrient/toxicant metabolism. (Same course as Environmental Toxicology 104.) GE credit: SciEng | OL, SE, SL.—S. (S.) Haj, Oteiza

### **105. Nutrition and Aging (3)**

Lecture—3 hours. Prerequisite: course 111AV or 111AY and Animal Biology 103 or the equivalent. Role of nutrition in the aging process from both an organismal/cell perspective, including demographics, theories of aging, nutrition and evolution, nutritional manipulation and life-span extension, and nutrition's impact on the diseases of aging. GE credit: SciEng | SE.—S. (S.)

### **111B. Recommendations and Standards for Human Nutrition (2)**

Lecture—2 hours. Prerequisite: Chemistry 8B; Neurology, Physiology, and Behavior 101 or the equivalent, course 111AV or 111AY. Critical analysis of the development of nutritional recommendations for humans. Topics include history of modern recommendations, development of the Recommended Dietary Allowance (RDA) and other food guides; the Dietary Reference Intakes (DRI); administrative structure of regulatory agencies pertinent to nutrition recommendations; introduction to scientific methods used to determine the recommendations; food labeling laws; nutrition recommendations in other countries and cultures. Not open for credit to students who have completed course 111.—S. (S.) Zidenberg-Cherr

### **111AY. Introduction to Nutrition and Metabolism (3)**

Web virtual lecture—3 hours; lecture/discussion—1 hour. Prerequisite: Chemistry 8B; Neurology, Physiology, and Behavior 101 or the equivalent. Restricted to upper division or graduate level students only. Introduction to metabolism of protein, fat and carbohydrate: the biological role of vitamins and minerals; nutrient requirements during the life cycle; assessment of dietary intake and nutritional status. Not open for credit to students who have completed course 101 or 111AV. GE credit: SciEng | SE.—W. (W.)

### **112. Nutritional Assessment (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Animal Biology 102 and 103 or course 101, Nutrition 111AV or 111AY, Statistics 13. Restricted to upper division or graduate level Nutrition students only. Methods of human nutritional assessment, including dietary, anthropometric, biochemical methods. Principles of precision, accuracy, and interpretation of results for individuals and populations. GE credit: SciEng | QL, SE.—S. (S.) Satre, Stewart

### **113. Principles of Epidemiology in Nutrition (4)**

Lecture/discussion—4 hours. Prerequisite: Plant Sciences 120 or equivalent. Introduction to epidemiology as it relates to the field of nutrition, including study design, principles of epidemiologic inference, criteria for causality, and interpreting measures of disease risk. GE credit: SciEng | QL, SE.—F. (F.) Stewart

### **114. Developmental Nutrition (4)**

Lecture—4 hours. Prerequisite: Animal Biology 102 and 103; course 111AV or 111AY, 111B. Role of nutritional factors in embryonic and postnatal development. GE credit: SciEng, Wrt | SE.—W. (W.) Keen

### **115. Animal Nutrition (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 8B or 118B or consent of instructor. Comparative differences among animals in digestion and metabolism of nutrients. Nutrient composition of feeds, digestive systems, digestion, absorption, feeding strategies. GE credit: SciEng, Wrt | OL, QL, SE, SL, VL, WE.—W. (W.) DePeters

### **116A. Clinical Nutrition (3)**

Lecture—3 hours. Prerequisite: course 111AV or 111AY, 111B, 112; Neurobiology, Physiology, and Behavior 101 or the equivalent. Biochemical and physiological bases for therapeutic diets. Problems in planning diets for normal and pathological conditions. GE credit: SciEng | SE.—F. (F.) Steinberg

### **116AL. Clinical Nutrition Practicum (3)**

Lecture—1 hour; laboratory—3 hours; discussion—1 hour. Prerequisite: course 116A (may be taken concurrently). Fundamental principles of planning and evaluating therapeutic diets and patient education for pathological conditions covered in 116A. GE credit: SciEng | SE.—F. (F.) Frank

### **116B. Clinical Nutrition (3)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 111AV or 111AY, 111B, 112; Neurobiology, Physiology, and Behavior 101 or the equivalent. Biochemical and physiological bases for therapeutic diets. Problems in planning diets for normal and pathological conditions. GE credit: SciEng | SE.—W. (W.) Zivkovic

### **116BL. Clinical Nutrition Practicum (3)**

Lecture—1 hour; laboratory—3 hours; discussion—1 hour. Prerequisite: course 116AL, and 116B (may be taken concurrently). Fundamental principles of planning and evaluating therapeutic diets and patient education for pathological conditions covered in 116B. Continuation of course 116AL. GE credit: SciEng | SE.—W. (W.)

### **117. Experimental Nutrition (6)**

Lecture—3 hours; laboratory—6 hours; extensive writing. Prerequisite: course 111AV or 111AY, 111B, 112, Biological Sciences 102, 103; Molecular and Cellular Biology 120L or other laboratory course in biochemistry is recommended. Methods of assessing nutritional status. Application of chemical, microbiological, chromatographic and enzymatic techniques to current problems in nutrition. GE credit: SciEng, Wrt | SE, WE.—F. (F.) Gaikwad

### **118. Community Nutrition (4)**

Lecture—4 hours. Prerequisite: course 111AV or 111AY, 111B, and 116A. Nutrition problems in contemporary communities and of selected target groups in the United States and in developing countries. Nutrition programs and policy, principles of nutrition education. GE credit: SciEng | SE, SL.—W. (W.) Heinig

### **119A. International Community-Based Nutritional Assessment (1)**

Lecture/discussion—1 hour. Prerequisite: course 112 (may be taken concurrently) and consent of instructor. Issues and problems related to community-based nutritional assessment in a low-income country, major nutritional problems in low-income countries; ethical issues in human investigation; survey design, data collection techniques, and data analysis; preparation for international travel; cross-cultural communication, health, and safety while living abroad.

### **119B. International Community-Based Nutritional Assessment (6)**

Lecture—2 hours; fieldwork—12 hours. Prerequisite: course 119A and consent of instructor. Restricted to upper division students in Clinical Nutrition, Community Nutrition, Dietetics, and Nutrition Science. A six-week summer course in Peru. Implementation of a community-based nutritional assessment survey, including development of the survey instrument, selection of the study sample, collection and verification of data, and analysis and interpretation of the results; the project will be carried out by paired participation of students and faculty members of UC Davis and the collaborating foreign institution.

### **120AN. Nutritional Anthropology (4)**

Lecture—3 hours, discussion—1 hour. Prerequisite: course 10 and Anthropology 2 recommended. Nutritional anthropology from historical and contemporary perspectives; the anthropological approach to food and diet; field work methods; case histories that explore food patterns and their nutritional implications. GE credit: SciEng or SocSci, Div | SE, SS.—Su. (Su.) Kurtz

### **120BN. Nutritional Geography (4)**

Lecture—3 hours; discussion—1 hour. Nutritional geography from historical and contemporary perspectives; the geographical approach to food and diet; cultural and environmental factors that influence dietary practices; food-related landscapes and patterns. GE credit: SciEng or SocSci, Div | SE, SS.

### **122. Ruminant Nutrition and Digestive Physiology (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 2A, 2B, 2C; Animal Biology 103 or Biological Sciences 103; Animal Science 100 or Neurobiology, Physiology, and Behavior 101 or consent of instructor; Mathematics 16B recommended. Study of nutrient utilization as influenced by the unique aspects of digestion and fermentation in ruminants, both domestic and wild. Laboratories include comparative anatomy, feed evaluation, digestion kinetics using fistulated cows, computer modeling, and microbial exercises. GE credit: SciEng | QL, SE.—S. (S.) Fadel

### **123. Comparative Animal Nutrition (3)**

Lecture—3 hours. Prerequisite: Animal Biology 103 or Biological Sciences 103. Restricted to upper division and graduate level students. Comparative nutrition of animals; including laboratory, companion, zoo, and wild, animals. Digestion and metabolic adaptations required for animal species to consume diverse diets. Relation of nutrition to metabolic adaptations and physiological states, including growth, reproduction, and diseases. GE credit: SciEng | SE.—S. (S.) Klasing

### **123L. Comparative Animal Nutrition Laboratory (1)**

Laboratory—3 hours. Prerequisite: Animal Biology 103 or Biological Sciences 103. Laboratory exercises leading to written reports on establishment of nutritional requirements and formulation of complete diets for laboratory, companion, zoo and wild animals.—S. (S.) Klasing

### **124. Nutrition and Feeding of Finfishes (3)**

Lecture—3 hours. Prerequisite: Animal Biology 103 or Biological Sciences 103. Principles of nutrition and feeding of fishes under commercial situations; implication of fish nutrition to the environment and conservation of endangered species. GE credit: SciEng | QL, SE, SL

### **127. Environmental Stress and Development in Marine Organisms (10)**

Lecture—4 hours; laboratory—12 hours; discussion—2 hours. Prerequisite: Environmental Toxicology 101 or Biological Sciences 102 or 104 or the equivalent; Environmental Toxicology 114A or course 114 recommended. Course taught at Bodega Marine Laboratory. Effects of environmental and nutritional stress, including pollutants, on development and function in embryos and larvae of marine organisms. Emphasis on advanced experimental methods. (Same course as Environmental Toxicology 127.) GE credit: SciEng | OL, QL, SE, SL, VL, WE.—Su. (Su.) Cherr

### **129. Journalistic Practicum in Nutrition (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: course 111AV or 111AY, 111B; a course in written or oral expression or consent of instructor. Critical analysis and discussion of current, controversial issues in nutrition; the use of journalistic techniques to interpret scientific findings for the lay public. Students will be required to write several articles for campus media. Course may be repeated one time for credit. GE credit: SciEng | OL, SE, SL, WE.

### **130. Experiments in Nutrition: Design and Execution (2)**

Laboratory—6 hours. Prerequisite: consent of instructor; course 111AV, 111AY, 111B or 114 recommended. Experiments in current nutritional problems. Experimental design: students choose project and, independently or in groups of two-three, design a protocol, complete the project, and report findings. May be repeated for credit up to six times (three times per instructor) with consent of instructor. GE credit: SciEng | SE.—F, W, S, Su. (F, W, S, Su.)

### **190. Proseminar in Nutrition (1)**

Seminar—1 hour. Prerequisite: course 111AV or 111AY, 111B. Restricted to senior standing. Discussion of human nutrition problems. Each term will involve a different emphasis among experimental, clinical, and dietary problems of community, national and international scope. May be repeated

two times for credit with consent of instructor. GE credit: SciEng | OL, SE, VL – F, W, S. (F, W, S.) Zidenberg-Cherr

### **190C. Nutrition Research Conference (1)**

Discussion—1 hour. Prerequisite: upper division standing in Nutrition or related biological science; consent of instructor. Introduction to research findings and methods in nutrition. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.) GE credit: SE, –F, W, S. (F, W, S.)

### **192. Internship (1-12)**

Internship—3-36 hours. Prerequisite: one upper division course in nutrition and consent of instructor. Work experience on or off campus in practical application of nutrition, supervised by a faculty member. (P/NP grading only.)

### **197T. Tutoring in Nutrition (1-2)**

Discussion/laboratory—3 or 6 hours. Prerequisite: Nutrition Science, Clinical Nutrition or related major; consent of instructor. Tutoring of students in nutrition courses, assistance with discussion groups or laboratory sections, weekly conference with instructor in charge of course: written evaluations. May be repeated if tutoring a different course. (P/NP grading only.) –F, W, S. (F, W, S.)

### **198. Directed Group Study (1-5)**

(P/NP grading only.)

### **199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.) GE credit: SE.

## **Graduate**

### **201. Vitamin and Cofactor Metabolism (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: one upper division nutritional biochemistry and physiology course. Review of studies and relationships involving the metabolic functions of vitamins. Comparative nutritional aspects and the metabolism and chemistry of vitamins and vitamin-like compounds.

### **203. Advanced Protein and Amino Acid Nutrition (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: one upper division nutritional biochemistry and physiology course. Nutritional significance of protein and amino acids, including studies of the influence of dietary protein on digestion, absorption, metabolism, resistance to disease, and food intake. Study of dietary requirements and interrelationships among amino acids.

### **204. Mineral Metabolism (2)**

Lecture—2 hours. Prerequisite: upper division nutrition or biochemistry course. Studies of metabolic functions and nutritional interrelationships involving minerals.

### **219A. International Nutrition (3)**

Lecture—3 hours. Prerequisite: graduate standing; undergraduates only admitted with consent of instructor after completion of course 111AV. Epidemiology, etiology, and consequences of undernutrition, with particular focus on the nutritional problems of children and women in low income populations. Offered in alternate years. –(W.) Dewey

### **219B. International Nutrition (3)**

Lecture—3 hours. Prerequisite: course 219A. Intervention programs to prevent or ameliorate nutritional problems in low-income populations. Planning, implementing, and evaluating nutrition intervention programs. Offered in alternate years. –(S.) Dewey

### **230. Experiments in Nutrition: Design and Execution (2)**

Laboratory—6 hours. Prerequisite: consent of instructor; courses 201, 202, 203, 204, or the equivalent recommended. Student selected projects to enhance laboratory skills. Independently, or in groups of two-three students, design a protocol, carry out the project, analyze the results and report the findings. May be repeated for credit up to six times (limit of three times per instructor) with consent of instructor. –F, W, S. (F, W, S.)

### **250. Metabolic Homeostasis (3)**

Lecture—2 hours; discussion—1.5 hours. Prerequisite: passing the Nutrition Graduate Group Preliminary Examination or consent of instructor. Preference given to students with advanced standing in the Nutrition Graduate Group. Regulatory mechanisms of carbohydrate, lipid, and protein homeostasis; mechanisms of metabolic enzyme regulation and of the metabolic hormones; homeostatic mechanisms and interactions; fuel-fuel interactions; nutrition energy balance.

### **251. Nutrition and Immunity (2)**

Lecture/discussion—2 hours. Prerequisite: Pathology, Microbiology, and Immunology 126, Medical Microbiology 107 or the equivalent, Animal Biology 102. Cellular and molecular mechanisms underlying interactions of nutrition and immune function, including modulation of immunocompetence by diet and effects of immune responses on nutritional needs. Lectures and discussion explore implications for resistance to infection, autoimmunity and cancer. Offered in alternate years. –W. Klasing, Erickson, Stephensen

### **252. Nutrition and Development (3)**

Lecture—3 hours. Prerequisite: courses 201, 202, 203, 204. Relationship of nutrition to prenatal and early postnatal development. –W. (W.) Keen, Oteiza

### **253. Control of Energy Balance and Body Weight (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: course 210A or 210B or consent of instructor. Comprehensive study of the biochemical, nutritional and physiological mechanisms controlling food intake, body composition and energy expenditure. Subject matter will be approached through lectures and discussions where students and staff will critically evaluate the literature.

### **254. Applications of Systems Analysis in Nutrition (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: course 202, Physiological Sciences 205A-205B or the equivalent. Quantitative aspects of digestion and metabolism; principles of systems analysis. Evolution of models of energy metabolism as applied in current feeding systems. Critical evaluations of mechanistic models used analytically in support of nutritional research.

### **257. Selected Topics in Nutritional and Hormonal Control of Nitrogen Metabolism (2)**

Lecture—2 hours. Prerequisite: courses 201 through 204; Physiological Sciences 205A-205B or the equivalent. Quantitative and qualitative aspects of nitrogen metabolism; critical evaluation of dietary intake, hormones and diet-hormone interactions which affect nitrogen metabolism, including protein synthesis-degradation, amino acid synthesis-catabolism, nitrogen transport-excretion, depending on current literature.

### **258. Field Research Methods in International Nutrition (3)**

Lecture/discussion—3 hours. Prerequisite: graduate standing or consent of instructor. Issues and problems related to implementation of nutrition field research in less-developed countries, including ethics; relationships with local governments, communities, and scientists; data collection techniques and quality assurance; field logistics; research budgets; and other administrative and personal issues. Offered in alternate years. –W. Dewey

### **259. Nutrition and Aging (2)**

Lecture—2 hours. Prerequisite: three of courses 201, 202, 203 and 204. Interaction between nutrition and aging. Topics include physiological/biochemical basis of aging, age-related changes affecting nutritional requirements, nutrition and mortality rate, assessment of nutritional status in the elderly, and relationship between developmental nutrition and the rate of aging.

### **260. Nutrition During Pregnancy (6)**

Lecture—5 hours; term paper. Prerequisite: acceptance into the Master's Degree program of Advanced Studies in Maternal and Child Nutrition. Overview of the anatomical, physiological and biochemical changes that occur during pregnancy and early development. Discussion and evaluation of nutritional/lifestyle factors associated with pregnancy outcomes and nutrition programs/interventions for pregnant women. –F. (F.) Heinig

### **261. Lactation and Infant Nutrition (6)**

Lecture—5 hours; discussion—1 hour. Prerequisite: course 260. Restricted to students enrolled in the MAS program; Nutrition graduate students by consent of instructor. Overview of the physiological and biochemical processes underlying human lactation and nutritional needs of both mother and infant. Development of skills in assessment, nutrition counseling, education and support of new mothers and their families. –W. (W.) Heinig

### **262. Child and Adolescent Nutrition (6)**

Lecture—5 hours; discussion—1 hour. Prerequisite: course 261. Restricted to students enrolled in the MAS program; Nutrition graduate students by consent of instructor. Relationships among nutrition, growth, and development during childhood and adolescence. Nutritional assessment for normal and high risk groups; psychological, social, and economic factors contributing to nutritional status. Nutritional needs and interventions for special groups, including obese children/adolescents, athletes, and eating disordered. –S. (S.) Heinig

### **263. Applied Research Methods in Maternal and Child Nutrition (4)**

Lecture—3 hours; term paper. Prerequisite: graduate standing. Restricted to students enrolled in the MAS program; Nutrition graduate students by consent of instructor. Application of epidemiological principles to the study of maternal and child nutrition. Topics include quantitative and qualitative study procedures, including study design, data collection, and related analytical techniques. –(F.) Heinig

### **264A. Current Topics in Maternal and Child Nutrition: Principles of Adult Education (2)**

Seminar—2 hours. Prerequisite: graduate standing. Restricted to students enrolled in the MAS program; Nutrition graduate students by consent of instructor. Current scientific literature related to Maternal and Child Nutrition in adult education settings. Topics include methods and theories of adult education and critical thinking skills related to research evaluation. Offered in alternate years. –(W.) Heinig

### **264B. Current Topics in Maternal and Child Nutrition: Epidemiology and Evidence-Based Practice (2)**

Seminar—2 hours. Prerequisite: graduate standing. Restricted to students enrolled in the MAS program; Nutrition graduate students by consent of instructor. Current scientific literature related to Maternal and Child Nutrition. Topics include epidemiology, evidence-based practice, breast feeding promotion, and nutritional assessment of populations. Offered in alternate years. –(W.) Heinig

### **264C. Current Topics in Maternal and Child Nutrition: Public Policy Development and Implementation (2)**

Seminar—2 hours. Prerequisite: graduate standing. Restricted to students enrolled in the MAS program; Nutrition graduate students by consent of instructor. Current scientific literature related to Maternal and Child Nutrition. Topics include nutrition surveillance and monitoring, as well as public policy development and implementation. Offered in alternate years. –(S.) Heinig

### **270. Scientific Ethics in Biomedical Studies: Emphasis on Nutrition (3)**

Lecture—1 hour; discussion—1 hour; term paper. Restricted to graduate standing or consent of instructor. Scientific ethics in biomedical studies, especially nutrition. Discussion and case study presentations on scientific integrity, fraud, misconduct, conflict of interest.

est, human and animal research protections. Not open for credit to students who have completed course 492B.—Steinberg

### **290. Beginning Nutrition Seminar (2)**

Lecture/discussion—1 hour; seminar—1 hour. Prerequisite: first year graduate standing. Discussion and critical evaluation of topics in nutrition with emphasis on literature review and evaluation in this field. Students give oral presentations on relevant topics.—F. (F.)

### **290C. Research Conference (1)**

Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Major professors lead research discussions with their graduate students. Research papers are reviewed and project proposals presented and evaluated. Format will combine seminar and discussion style. (S/U grading only.)—F. (F.)

### **291. Advanced Nutrition Seminar (1)**

Seminar—1 hour. Prerequisite: second-year graduate standing. Advanced topics in nutrition research. Multiple sections may be taken concurrently for credit. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

### **293A. Current Topics in Obesity, Food Intake and Energy Balance (3)**

Lecture—1 hour; seminar—1 hour; discussion—1 hour. Prerequisite: graduate standing or course 129. Undergraduates with upper division standing with at least one writing course may enroll with consent of instructor. Current research and its evaluation. Principles of experimental design and scientific background for given article. Articles summarized for posting on Internet for use by healthcare professionals. May be repeated for credit with consent of instructor.

### **293B. Current Topics in Obesity, Food Intake, and Energy Balance with Special Topics (3)**

Lecture—1 hour; seminar—1 hour; discussion—1 hour. Prerequisite: graduate standing or course 129. Undergraduates with upper division standing with at least one writing course may enroll with consent of instructor. A continuation of course 293A, with additional special topics. May be repeated for credit up to 3 times with consent of instructor.

### **294A. Current Topics in Developmental Nutrition (2)**

Seminar—2 hours. Prerequisite: course 114 or 252 or consent of instructor. Restricted to graduate standing or consent of instructor. Effects of nutrition on embryology, morphogenesis, and developmental mechanisms. May be repeated for credit when topic differs.—F. (F.)

### **297T. Supervised Teaching in Nutrition (1-3)**

Teaching under faculty supervision—3-9 hours. Prerequisite: graduate standing in nutrition or consent of instructor. Practical experience in teaching nutrition at the university level; curriculum design and evaluation; preparation and presentation of material. Assistance in laboratories, discussion sections, and evaluation of student work. (S/U grading only.)—F, W, S. (F, W, S.)

### **298. Group Study (1-5)**

F, W, S. (F, W, S.)

### **299. Research (1-12)**

(S/U grading only.)—F, W, S. (F, W, S.)

## **Professional**

### **492A. Professionalism: An Academic Perspective (2)**

Lecture/discussion—2 hours. Prerequisite: graduate standing. For graduate students in their initial quarter of residence. Professionalism topics are presented and examples drawn from both the biological and social sciences.

### **492C. Grant Writing (3)**

Lecture—1.5 hours; discussion—1.5 hours. Prerequisite: graduate standing in Nutrition or consent of instructor. Preparation of grants for governmental agencies (particularly NIH and USDA) and private foundations. Students will write a research grant or

fellowship application. May be repeated one time for credit with consent of instructor. Offered in alternate years.

## **Nutritional Biology (A Graduate Group)**

Carolyn Slupsky, Ph.D., Chairperson of the Group

**Graduate Group Office.** 1249 Meyer Hall  
530-754-7684; <http://ggnb.ucdavis.edu>

### **Faculty**

Lindsay H. Allen, Ph.D., RD, Professor (*Nutrition*)  
Lars Berglund, Ph.D., Professor (*Endocrinology*)  
Kenneth H. Brown, M.D., Professor (*Nutrition*)  
C. Christopher Calvert, Ph.D., Professor (*Animal Science*)  
Edward J. DePeters, Ph.D., Professor (*Animal Science*)  
Kathryn G. Dewey, Ph.D., Professor (*Nutrition*)  
Kent L. Erickson, Ph.D., Professor (*Cell Biology and Human Anatomy*)  
James G. Fadel, Ph.D., Professor (*Animal Science*)  
Andrea J. Faseltti, D.V.M, Ph.D., Associate Professor (*Molecular Biosciences*)  
Nilesh W. Gaikwad, Ph.D., Associate Professor (*Nutrition, Environmental Toxicology*)  
J. Bruce German, Ph.D., Professor (*Food Science and Technology*)  
M. Eric Gershwin, M.D., Professor (*Internal Medicine*)  
Ralph Green, M.D., Professor (*Pathology*)  
Ian J. Griffin, M.D., Associate Professor (*Pediatrics*)  
Jean-Xavier Guinard, Ph.D., Professor (*Food Science and Technology*)  
Robert M. Hackman, Ph.D., Research Nutritionist (*Nutrition*)  
Fawaz G. Haj, Ph.D., Assistant Professor (*Nutrition*)  
Peter J. Havel, Ph.D., Professor (*School of Veterinary Medicine*)  
Liping Huang, Ph.D., Adjunct Professor (*USDA, WHNRC*)  
Daniel Hwang, Ph.D., Adjunct Professor (*USDA, WHNRC*)  
Lucia Kaiser, Ph.D., Professor (*Nutrition*)  
Sidika E. Kasim-Karakas, M.D., Professor (*Internal Medicine*)  
George A. Kaysen, M.D., Ph.D., Professor (*Internal Medicine*)  
Carl L. Keen, Ph.D., Distinguished Professor (*Nutrition, Internal Medicine*)  
Nancy L. Keim, Ph.D., Associate Adjunct Professor (*USDA, WHNRC*)  
Darshan S. Kelley, Ph.D., Adjunct Professor (*Nutrition*)  
Janet C. King, Ph.D., R.D. Professor (*Nutrition*)  
Kirk C. Klasing, Ph.D., Professor (*Animal Science*)  
Jennifer A. Larsen, Ph.D., Assistant Professor of Clinical Nutrition (*Molecular Biosciences*)  
Kevin D. Laugero, Ph.D., Assistant Adjunct Professor (*USDA, WHNRC*)  
Bo L. Lönnadal, Ph.D., Professor (*Nutrition, Internal Medicine*)  
Stanley L. Marks, B.V.Sc., Ph.D., Associate Professor (*Medicine and Epidemiology*)  
Valentina Medici, M.D., Assistant Professor (*Internal Medicine*)  
John W. Newman, Ph.D., Associate Professor (*Nutrition*)  
James W. Oltjen, Ph.D., Professor (*Animal Science*)  
Patricia Oteiza, Ph.D., Professor (*Nutrition, Environmental Toxicology*)  
Anthony F. Philippi, M.D., Professor (*Pediatrics*)  
Jon J. Ramsey, Ph.D., Associate Professor (*Molecular Biosciences*)  
Helen E. Raybould, Ph.D., Professor (*Anatomy, Physiology and Cell Biology*)  
Heidi A. Rossow, Ph.D., Associate Professor (*School of Veterinary Medicine*)  
John C. Rutledge, Ph.D., Professor (*Endocrinology*)  
Karen Ryan, Ph.D., Assistant Professor (*Neurobiology*)

Roberto D. Sainz, Ph.D., Associate Professor (*Animal Science*)  
Carolyn M. Slupsky, Ph.D., Professor (*Nutrition/Food Science*)

Charles Stebbins, Ph.D., Professor (*Cardiovascular Medicine*)  
Francene M. Steinberg, Ph.D., R.D., Professor (*Nutrition*)

Charles B. Stephensen, Ph.D., Adjunct Professor (*USDA, WHNRC*)  
Christine P. Stewart, Ph.D., Assistant Professor (*Nutrition*)  
Amer Y. Taha, Ph.D., Assistant Professor (*Food Science*)

Natalie Torok, Ph.D., Associate Professor (*Gastroenterology & Hepatology*)  
Marta Van Loan, Ph.D., Adjunct Professor (*Nutrition/USDA, WHNRC*)

Craig H. Warden, Ph.D., Associate Professor (*Neurobiology, Physiology, and Behavior*)  
Carl K. Winter, Ph.D. (*Extension Food Toxicologist*)

Heather M. Young, R.N., Ph.D., M.S.N., Associate Vice Chancellor and Dean (*Betty Irene Moore School of Nursing*)  
Sheri A. Zidenberg-Cherr, Ph.D., Professor (*Nutrition*)  
Angela M. Zivkovic, Ph.D., Assistant Professor (*Nutrition*)  
Susan Zunino, Ph.D., Adjunct Associate Professor (*Nutrition*)

### **Emeriti Faculty**

Betty Burri, Ph.D., Associate Adjunct Professor (*Nutrition*)  
Andrew Clifford, Ph.D., Distinguished Professor Emeritus (*Nutrition*)

Harry W. Colvin, Jr., Ph.D., Professor Emeritus  
Douglas E. Conklin, Ph.D., Professor Emeritus (*Animal Science*)  
Paul Davis, Ph.D., Research Professor Emeritus (*Animal Science*)

Richard A. Freedland, Ph.D., Professor Emeritus  
William N. Garrett, Ph.D., Professor Emeritus  
Dorothy W. Gietzen, Ph.D., Professor Emeritus  
M.R.C. Greenwood, Ph.D., Distinguished Professor Emerita (*Nutrition*)  
Louis Grivetti, Ph.D., Professor Emeritus

Charles H. Halsted, M.D., Professor Emeritus  
Robert J. Hansen, Ph.D., Professor Emeritus  
Patricia R. Johnson, Ph.D., Emerita (*Nutrition*)  
Amy Block Joy, Ph.D., Specialist in Cooperative Extension  
Jiro J. Kaneko, D.V.M., Ph.D., D.V.Sc. (hc), Professor Emeritus

Janet King, Ph.D., Professor Emeritus  
Verne E. Mendel, Ph.D., Professor Emeritus  
Roy L. Martin, Ph.D., Adjunct Professor (*Nutrition*)  
Judith S. Stern, Sc.D., R.D., Distinguished Professor (*Nutrition, Internal Medicine*)

Vincent A. Ziboh, Ph.D., Professor (*Dermatology, Biological Chemistry*)  
Roger McDonald, Professor Emeritus (*Nutrition*)  
Verne E. Mendel (*Neurobiology/Nutrition*)  
James G. Morris, Ph.D., Professor Emeritus  
Ernesto Pollitt, Ph.D., Professor Emeritus  
Robert B. Rucker, Ph.D., Professor Emeritus (*Nutrition*)

Barbara O. Schneeman, Ph.D., Professor Emeritus  
Howard G. Schutz, Ph.D., Professor Emeritus  
Donal A. Walsh, Ph.D., Professor  
Bruce M. Wolfe, M.D., Professor Emeritus  
Judith S. Stern, Sc.D., R.D., Distinguished Professor (*Nutrition, Internal Medicine*)

**Graduate Study.** The Graduate Group in Nutritional Biology offers programs of study and research leading to the M.S. and Ph.D. degrees. The great diversity of research interests represented by the faculty members allows students to choose from a wide variety of themes: nutritional biochemistry, animal nutrition, nutrition and development, nutrient bioavailability, human/clinical nutrition, nutrition and behavior, nutritional energetics, community nutrition, community health, maternal and child nutrition, nutrition and endocrinology, international nutrition, obe-

sity/body composition, physiology of digestion, nutrition and chronic disease, culture and nutrition, nutrition and gene expression, nutrition and aging, food preferences, nutrition and immunity, diet and exercise, dietary assessment, protein and lipid metabolism, food intake regulation, nutrition education, and more.

**Graduate Advisers.** Consult the Nutritional Biology Graduate Group office.

## Courses in Nutritional Biology (NUB)

### Graduate

#### 210A. Advanced Nutrition I: Nutrition and Metabolism, Macronutrients (5)

Lecture—4 hours; discussion—1 hour. Prerequisite: admission to the Nutritional Biology Graduate Group or consent of instructor. Class size limited to 30 students. Advanced general nutritional concepts. Integrating nutrition with biological systems, population nutrition issues, and research approaches. Advanced concepts on lipid and protein metabolism.—F. (F.) Oteiza

#### 210B. Advanced Nutrition II: Nutrition and Cell Biology, Micronutrients (5)

Lecture—4 hours; discussion—1 hour. Prerequisite: admission to the Nutritional Biology Graduate Group or consent of instructor. Class size limited to 30 students. Effects of nutrients at the cellular level. Principles of cell signaling and signaling modulation by nutrients. Advanced concepts of mineral and vitamin metabolism. Mineral and vitamin deficiencies and associated pathologies.—W. (W.) Haj

#### 210C. Advanced Nutrition III: Nutrition in Health and Disease (5)

Lecture—4 hours; discussion—1 hour. Prerequisite: admission to the Nutritional Biology Graduate Group or consent of instructor. Class size limited to 30 students. Integration of biochemical, physiological, and genetic aspects of nutrition in the context of clinical and epidemiological observations related to health and disease, including obesity and diabetes, cancer, vascular and neurodegenerative diseases, osteoporosis, and birth defects. Review and consideration of governmental.—S. (S.) Slupsky

#### 290C. Research Group Conference (1)

Discussion—1 hour. Prerequisite: graduate standing. Weekly conference on research problems, progress and techniques in animal sciences. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

#### 298. Directed Group Study (1-5)

Prerequisite: graduate standing in Nutritional Biology Graduate Group, or consent of instructor. May be repeated three times for credit when topics differs and consent of instructor.—F, W, S. (F, W, S.)

#### 299. Research (1-12)

Prerequisite: consent of instructor. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## Nutrition Science

(College of Agricultural and Environmental Sciences)

### Faculty

See the Department of [Nutrition](#), on page 490.

### The Major Program

The study of nutrition encompasses all aspects of the consumption and utilization of food and its constituents. Key areas of study include: the biochemical reactions important to the utilization of nutrients and food constituents; the impact of diet on health and disease; and, nutrition-related policy and public health issues. The nutrition science major includes two options for studying these areas: *nutritional biology* and *nutrition in public health*.

**The Program.** Nutrition as it is taught on the Davis campus is a biological science and requires a complete background in chemistry and biology, along with calculus and physics (nutritional biology option)

or economics (nutrition in public health option). These courses are generally completed during the first two years, and along with biochemistry, must be completed before most nutrition classes can be taken. During their junior and senior years, students in the nutritional biology option take additional course work in biochemistry, physiology, and toxicology. Students in the nutrition in public health option take additional course work in social and health-related sciences.

**Career Alternatives.** Both options are excellent preparation for professional or graduate training in medicine, public health, or other health sciences. The nutritional biology option also provides preparation for technical work in nutrition in the animal, food, and pharmaceutical industries. The nutrition in public health option prepares students for jobs in administrative, teaching, or public health/public service positions.

### B.S. Major Requirements:

UNITS  
**Preparatory Subject Matter.....63-66**

Biological Sciences 2A, 2B & 2C .....	15
Chemistry 2A-2B-2C and 8A-8B, or 118A-118B, or 128A-128B and 129A .....	21-23
Nutrition 10 .....	3
Plant Sciences 120 .....	4
Sociology 46A or Psychology 41 .....	4
The remaining preparatory subject matter is based on which major option you choose.	

*Nutritional Biology option:*

Anthropology 2 or Psychology 1 or Sociology 1 or 3 .....	4-5
Mathematics 16A-16B .....	6
Physics 1A-1B .....	6

*Nutrition in Public Health option:*

Anthropology 2 or Sociology 1 or 3 .....	4-5
Economics 1A-1B .....	8
Psychology 1 .....	4

**Depth Subject Matter .....77-82**

Biological Sciences 101 .....	4
Food Science and Technology 100A and 100B .....	8
Microbiology 102 and 103L .....	5
Neurobiology, Physiology, and Behavior 101, 101L .....	8
Nutrition 111AY, 111B, 112, 116A .....	12
The remaining depth subject matter is based on which major option you chose when completing your preparatory courses.	

*Nutritional Biology option:*

Biological Sciences 102, 103 .....	6
Molecular and Cellular Biology 120L .....	6
Neurobiology, Physiology, and Behavior 114 .....	3
Nutrition 104, 117 .....	10
Nutrition Restricted Electives .....	15-20

Selection of courses must be made in consultation with a faculty adviser prior to or upon reaching the 120 unit level:

Exercise Biology 110; Nutrition 99, 105, 113, 114, 115, 116B, 118, 120AN, 120BN, 122, 123, 124, 127, 130, 190, 192, 199	
---	--

<i>Nutrition in Public Health option:</i>	
Animal Biology 102, 103 .....	10
Exercise Biology 110 .....	3
Nutrition 118 .....	4
Nutrition Restricted Electives .....	15-20

Selection of courses must be made in consultation with a faculty adviser prior to or upon reaching the 120 unit level:

Food Service Management 120, 122; Nutrition 99, 104, 105, 113, 114, 116B, 117, 120AN, 120BN, 129, 130, 190, 192, 199	
--	--

Restricted Electives .....

Choose one of the following areas to complete the restricted elective units in:

#### Agricultural and Health Policy:

Agricultural & Resource Economics 15, 120, Public Health Sciences 175W, or

Political Science 109

### Cultural Diversity & Community Change:

African American and African Studies 100, American Studies 55, Agricultural and Resource Economics 112, Communication 136, Community & Regional Development 2, 152, 176, International Agricultural Development 10, 103, Science and Society 130, or Sociology 181

### Community Health and Education:

Communication 165, Education 110, 120, 153, Psychology 126, 130 or Sociology 154

### Natural and Applied Sciences:

Chicano Studies 140A, Community & Regional Development 20, Environmental Toxicology 101, 128, Exercise Biology 101, 102, 113, 117, Human Development 100A, 100B, 100C, Neurobiology, Physiology & Behavior 132, Philosophy 15, Plant Sciences 151, Science and Society 2, 15, 90C, or 90F

**Total Units for the Degree.....140-148**

**Major Adviser.** Niles Gaikwad

**Advising Center** for the major is located in 3202 Meyer Hall 530-752-2512.

**Dietetics Internship.** To fulfill the academic requirements for an internship in Dietetics, students are strongly advised to declare the Clinical Nutrition major. Within the Nutrition in Public Health option, students should also take: English 3 or University Writing Program 1 and Communication 1. The following courses must also be added (some of which may meet restricted elective requirements): Agricultural and Resource Economics 112; Nutrition 116B, 116AL-BL; Food Service Management 120, 120L, 122. Students intending to apply for admission to a dietetic internship should contact the Advising Center no later than the first quarter of the junior year for information on procedures.

**Graduate Study.** The Department of Nutrition offers programs of study and research leading to the M.S. and Ph.D. degrees in Nutrition. For information on graduate study contact the graduate adviser. See [Graduate Studies](#), on page 120.

## Obstetrics and Gynecology

See [Medicine, School of](#), on page 427.

## Oceanography

(College of Letters and Science)

Oceanography is the study of the earth's oceans, investigating connections between geological, biological, chemical and physical processes in the marine realm, and the interactions between the Earth's ocean/atmosphere system. The interdisciplinary minor in oceanography is for students with backgrounds in any of these fields, as well as those interested in marine policy and conservation. The curriculum reflects the integrative nature of oceanography, with core courses covering the major disciplines in oceanography and elective courses that allow students to cater the minor to their interests. The oceanography minor includes courses taught at the Davis campus and courses offered at Bodega Marine Laboratory.

The minor is sponsored by the Department of Earth and Planetary Sciences in 2119 Earth and Physical Sciences Building.

### Minor Program Requirements:

UNITS
<b>Oceanography.....22-24</b>
Geology 150A/Environmental Science and Policy 150A .....

4

Fall 2011 and on Revised General Education (GE): AH=Arts and Humanities; SE=Science and Engineering; SS=Social Sciences;

ACGH=American Cultures; DD=Domestic Diversity; OL=Oral Skills; QL=Quantitative; SL=Scientific; VL=Visual; WC=World Cultures; WE=Writing Experience

Pre-Fall 2011 General Education (GE): ArtHum=Arts and Humanities; SciEng=Science and Engineering; SocSci=Social Sciences; Div=Domestic Diversity; Wrt=Writing Experience

Quarter Offered: F=Fall, W=Winter, S=Spring, Su=Summer; 2017-2018 offering in parentheses

Geology 150B/Environmental Science and Policy 150B.....3  
 Geology 150C/Environmental Science and Policy 150C .....4  
 Environmental Science and Policy 152 ....3  
 An electives sequence, with one course from group (a) and one to two additional electives from either groups (a) or (b):.....8-10  
 (a) Geology 116N/Environmental Science and Policy 116N, Atmospheric Science 158, Wildlife, Fish, and Conservation Biology 120, 157, Environmental Toxicology 120, Evolution and Ecology 112, 115;  
 (b) Atmospheric Science 121A, 121B, Geology 108, 109, 152, Evolution and Ecology 106, 114, Environmental Science and Policy 124, Environmental Toxicology 127

**Note.** Courses Geology 150C, Environmental Science and Policy 150C, Environmental Science and Policy 124, 152, Environmental Toxicology 127, and Evolution and Ecology 106 and 114 are taught at Bodega Marine Laboratory.

**Minor Adviser.** T. M. Hill (*Earth and Planetary Sciences*)

## Ophthalmology

See *Medicine, School of*, on page 427.

## Organizational Studies

See *Sociology*, on page 544.

## Orthopaedic Surgery

See *Medicine, School of*, on page 427.

## Otolaryngology

See *Medicine, School of*, on page 427.

## Parks and Recreation

See *Community and Regional Development*, on page 221; *Design*, on page 233; *Environmental Planning and Management* (under *Environmental Horticulture*, on page 323); *Landscape Architecture*, on page 392; and *Physical Education*, on page 501.

## Pathology

See *Pathology (PMD)*, on page 446; *Pathology, Microbiology, and Immunology*, on page 495; and *Plant Pathology*, on page 513.

## Pathology, Microbiology, and Immunology

See *Veterinary Medicine, School of*, on page 581.

## Pediatrics

See *Medicine, School of*, on page 427.

## Performance Studies (A Graduate Group)

Joe Dumit, Director

Marian Bilheimer, Graduate Coordinator

**Arts Group Graduate Office.** 216B Art Building; 530-754-6973; [mbilheimer@ucdavis.edu](mailto:mbilheimer@ucdavis.edu)  
<http://performancesstudies.ucdavis.edu/>

**Faculty.** Executive: Maxine Craig (*Women and Gender Studies*), Joseph Dumit (*Science and Technology Studies, Anthropology*), Peter Lichtenfels (*Theatre and Dance*), Halifu Osumare (*African American and African Studies*)

There are over 45 affiliated faculty in departments throughout HARCS and other faculty, all of whom offer courses relevant to the discipline.

**Graduate Study.** The Ph.D. in Performance Studies is a four-year program. In the first two years of study, students develop an understanding of performance by drawing from a range of regular course offerings in the field to identify, explore, and define a field or fields of research. Students are required to complete four core courses out of five in performance studies, and one colloquium course. Each individual program is then built from seminar and/or practice as research courses, as well as independent or group studies, developing one or more of the four strands of the program: Comparative Medias, Embodiments, Cultures/Ecologies, and History/Text. A wide range of affiliated faculty offer courses throughout the HARCS faculty, and Designated Emphases are available in Studies in Performance and Practice, African American and African Studies, Critical Theory, Feminist Theory and Research, Native American Studies, and Writing, Rhetoric and Composition Studies. Students are required to complete a minimum of 60 units before taking the qualifying examination. No more than 12 units may be taken below the graduate level unless specifically approved by the Ph.D. graduate program adviser.

**Main Program Adviser.** Lynette Hunter (*Theatre and Dance*)

**Graduate Advisers.** Emily Albu (*Spanish & Classics*), Susan Avila (*Design*), Seeta Chaganti (*English*), Maxine Craig (*Women and Gender Studies*), Halifu Osumare (*African American and African Studies*), Kriss Ravetto (*Cinema and Technocultural Studies*), Henry Spiller (*Music*), Archana Venkatesan (*Comparative Literature, Religious Studies*), Hegnar Watengaugh (*Art, Art History*)

### Courses in Performance Studies (PFS)

#### Graduate

##### 200. Methods and Materials in Theatre Research (4)

Seminar—3 hours; term paper. Essential research tools in theatre and related fields; bibliographies, primary sources; methods of evaluating and presenting evidence; delineating research areas in the field.—F. (F.)

### 259. Topics in Contemporary Theatre and Performance (4)

Seminar—3 hours; term paper. Special topics designed to study in depth aspects of contemporary performance including performance analysis, cultural and historical context, modes of production, theoretical and political entailments, and issues of spectatorship; e.g., "Brecht and After," "British Theater," "Race and Gender in Performance." May be repeated five times for credit.—F, W, S. (F, W, S.)

### 265A. Performance Studies: Modes of Production (4)

Seminar—3 hours; term paper. Introduction to the literature of performance production in a variety of media: theatre, dance, film, video, computer-based, looking at cultural, aesthetic, rhetorical and political theory. May be repeated three times for credit when topic differs. Offered in alternate years.

### 265B. Performance Studies: Signification and the Body (4)

Seminar—3 hours; term paper. Introduction to analysis of the body in performance, drawing on theoretical models from several fields. May be repeated three times for credit when topic differs. Offered in alternate years.

### 265C. Performance Studies: Performance and Society (4)

Seminar—3 hours; term paper. Introduction to the role of performance (broadly defined), in everyday life, sociopolitical negotiation, identity, social movements, the media, and the state. May be repeated three times for credit when topic differs. Offered in alternate years.

### 265D. Performance Studies: Theory, History, Criticism (4)

Seminar—3 hours; term paper. Introduction to the theory, history and criticism, informing performance studies. May be repeated three times for credit when topic differs. Offered in alternate years.

### 270A. Individually Guided Research in Performance Studies (4)

Discussion—1 hour; independent study; extensive writing. Prerequisite: course 200; one from course 265A, B, C, or D; consent of instructor. Restricted to students in the Graduate Group PhD in Performance Studies. Individually guided research, under the supervision of a faculty member, on a Performance Studies topic related to the student's proposed dissertation project to produce a dissertation prospectus.

### 270B. Individually Guided Research in Performance Studies (4)

Discussion—1 hour; independent study; extensive writing. Prerequisite: course 200; one of courses 265A, B, C, or D; consent of instructor. Restricted to students in the Graduate Group PhD in Performance Studies. Individually guided research, under the supervision of a faculty member, on a Performance Studies topic related to the student's proposed dissertation project, to produce a dissertation prospectus.

### 270C. Individually Guided Research in Performance Studies (4)

Discussion/laboratory—2 hours; fieldwork; term paper. Prerequisite: course 200; one of courses 265A, B, C, or D; consent of instructor. Restricted to students in the Graduate Group PhD in Performance Studies. Individually guided research, under the supervision of a faculty member, on a Performance Studies topic related to the student's proposed dissertation project to produce a dissertation prospectus.

### 290. Colloquia in Performance Studies (4)

Lecture/discussion—2 hours; discussion/laboratory—1 hour; term paper. Prerequisite: registration in Performance Studies Graduate Group and prior to Qualifying Examination. Designed to provide cohort identity and faculty exchange. Opportunity to present papers, hear guest lecturers, and see faculty presentations, gather for organizational and administrative new, exchange of information and make announcements. Course must be taken every year that a Performance Studies graduate is registered, prior to taking the Qualifying Examination. May be repeated four times for credit. Limited to four units per year. (S/U grading only.)—S. (S.)

**298. Group Study (1-5)**

Independent study—1.5 hours. Prerequisite: consent of instructor.—F, W, S. (F, W, S.)

**299. Individual Study (1-12)**

Prerequisite: consent of instructor. (S/U grading only.)—F, W, S. (F, W, S.)

**299D. Dissertation Research (1-12)**

Prerequisite: consent of instructor and Advancement to Candidacy. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**Professional****459. Approaches to Theatre and Dance (4)**

Seminar—3 hours; term paper; project. Prerequisite: consent of instructor; advanced graduate students. Work on approaches to theatre, dance, film/video, design and performance, with a focus on methodology and professional development. May be repeated five times for credit. Offered irregularly.

## Pharmacology and Toxicology

See Medical Pharmacology and Toxicology (PHA), on page 443; Molecular Biosciences (VMB), on page 582; and Pharmacology and Toxicology (A Graduate Group), on page 496.

## Pharmacology and Toxicology (A Graduate Group)

Kermit L. Carraway, Chairperson of the Group

**Group Office.** 4117 Meyer Hall (Department of Environmental Toxicology 530-752-4516; <http://ptx.ucdavis.edu/>)

**Faculty.** The more than 90 faculty in the graduate group represent at least 25 academic departments and organized research units within the College of Agricultural and Environmental Sciences, the College of Biological Sciences, the School of Medicine and the School of Veterinary Medicine.

**Graduate Study.** The program, which offers both the M.S. and Ph.D. degree, emphasizes an interdisciplinary approach that combines coursework and experimental training in modern approaches to pharmacological and toxicological problems. Areas of research span fundamental and translational research in a broad spectrum of areas within pharmacology and toxicology, including cardiovascular pharmacology, cancer therapeutics, neuropharmacology, drug discovery and design, neurotoxicology, pulmonary toxicology and environmental toxicology. Students complete core courses in pharmacology and toxicology and carry out research rotations during their first year of study. All Ph.D. students receive financial support. For detailed information on the program, contact the Group office, graduate advisers, or the Group chairperson.

**Graduate Advisers.** K. Carraway (Biochemistry & Molecular Medicine), A. Gelli (Pharmacology), R. Harper (Pulmonary Medicine), P. Henderson (Hematology & Oncology), Mary Horne (Pharmacology), H. Knych (Molecular Biosciences), J.A. Last (Pulmonary Medicine), P. Lein (Molecular Biosciences), L. Miller (Anatomy, Physiology & Cell Biology), K. Pinkerton (Center for Health and Environment), B. Puschner (Molecular Biosciences), H. Wulff (Pharmacology)

## Courses in Pharmacology and Toxicology (PTX)

Additional courses that satisfy the breadth and depth requirements of the program are taught under departments of faculty in the group.

**Graduate****201. Principles of Pharmacology and Toxicology I (5)**

Lecture—5 hours. Prerequisite: Biological Sciences 102 and Neurobiology, Physiology, and Behavior 101. First of three courses presenting fundamental principles of pharmacology and toxicology. Introductory overview of basic concepts in pharmacology/toxicology, followed by in-depth blocks on fate processes of chemicals in the body, fate processes in tissue selective responses, selective toxicity employed therapeutically.—F. (F) Puschner, Knych

**202. Principles of Pharmacology and Toxicology II (4)**

Lecture—4 hours. Prerequisite: course 201. The second of three courses presenting fundamental principles of pharmacology and toxicology. Principles of pharmacodynamics and mechanisms of drug/toxicant actions.—W. (W.) Angelastro, Eiserich

**203. Principles of Pharmacology and Toxicology III (4)**

Lecture—4 hours. Prerequisite: courses 201 and 202. Integrated physiological systems, cardiovascular and nervous systems and how drugs and toxicants act to perturb function.—S. (S.) Berman, Gelli

**215. Electrophysiology Techniques and Applications (3)**

Lecture—1.5 hours; discussion—1.5 hours. Broad scope of topics in electrophysiology techniques and applications. (Same course as Molecular, Cellular and Integrative Physiology 215.) (S/U grading only.)—S. (S.) Chen

**230. Advanced Topics in Pharmacology and Toxicology (1-3)**

Lecture/discussion/seminar—1 hour each (course format can vary at option of instructor). Prerequisite: course 201 and consent of instructor. In-depth coverage of selected topics for graduate students in Pharmacology-Toxicology and related disciplines. Topics determined by instructor in charge for each quarter.—F, W, S. (F, W, S.)

**277. Molecular Mechanisms in Cancer and other Diseases (3)**

Lecture/discussion—2 hours; project. Prerequisite: undergraduate or graduate introductory course in cell biology (such as Biological Sciences 104), and general biochemistry (Molecular & Cellular Biology 121 or 122) required; course 202 recommended. Restricted to graduate standing or consent of instructor. Exploration of cutting edge investigations on the underlying mechanisms of cancer biology, cancer therapy and other diseases. Current medical research in Cancer and other diseases, as it spans the bench to bedside.—S. (S.) Goldkorn

**290. Seminar (1)**

Current topics in pharmacology and toxicology. (S/U grading only.)—F, W, S. (F, W, S.)

**290C. Advanced Research Conference (1)**

Lecture/discussion. Provide credit for participation in and attendance at research conferences. May be repeated three times for credit. (S/U grading only.)—F, W, S. (F, W, S.) Puschner

**299. Research (1-12)**

(S/U grading only.)

## Philosophy

(College of Letters and Science)

James Griesemer, Ph.D., Chairperson of the Department

**Department Office.** 101 Young Hall  
[philadvising@ucdavis.edu](mailto:philadvising@ucdavis.edu);  
<http://philosophy.ucdavis.edu>

**Faculty**

David Copp, Ph.D., Distinguished Professor  
 Zoe Drayson, Ph.D., Assistant Professor  
 Cody Gilmore, Ph.D., Associate Professor  
 James R. Griesemer, Ph.D., Professor  
 Elaine M. Landry, Ph.D., Professor  
 Hanti Lin, Ph.D., Assistant Professor  
 George J. Matthey II, Ph.D., Senior Lecturer  
 Robert May, Ph.D., Professor  
 Roberta Millstein, Ph.D., Professor  
 Bernard Molyneux, Ph.D., Associate Professor  
 Alyssa Ney, Ph.D., Associate Professor  
 Marina A. L. Oshana, Ph.D., Professor  
 Christina Rulli, Ph.D., Assistant Professor  
 Adam Sennet, Ph.D., Associate Professor  
 Jan Szafir, Ph.D., Professor

**Emeriti Faculty**

William H. Bossart, Ph.D., Professor Emeritus  
 Robert C. Cummins, Ph.D., Professor Emeritus  
 Gerald Dworkin, Ph.D., Distinguished Professor Emeritus  
 Joel I. Friedman, Ph.D., Professor Emeritus  
 Neal W. Gilbert, Ph.D., Professor Emeritus  
 Michael Jubien, Ph.D., Professor Emeritus  
 John F. Malcolm, Ph.D., Professor Emeritus  
 Paul Teller, Ph.D., Professor Emeritus  
 Michael V. Wedin, Ph.D., Professor Emeritus  
 George Wilson, Ph.D., Professor Emeritus

**The Major Program**

Philosophy addresses problems and questions that arise in all areas of human thought and experience and in all disciplines. Recurring questions about the nature of value, the good life, right conduct, knowledge, truth, language, mind, and reality are central to philosophical study. Philosophy also investigates the methodologies and assumptions of the major disciplines in the university in order to deepen our understanding of the sciences, of mathematics, art, literature, and history, and of religion and morality. It leads us to address issues about the nature of these subjects, about the methods of reasoning characteristic of them, and about the contributions they make to our understanding of ourselves and our world.

Philosophy contributes to the liberal education of its students. The department emphasizes an analytic approach to philosophical questions, which trains students to understand and evaluate arguments and to think and write precisely and clearly. These skills are of immense value in a variety of careers.

**The Program.** The Department of Philosophy offers its majors a choice among three options. The General Emphasis provides a broad view of the field of philosophy. It includes a breadth requirement at the lower division level while providing students wide choice in more advanced courses. The Pre-Law and Pre-Med Emphases include courses that provide philosophical perspective on law and medicine respectively and that also provide important preparation for professional school.

The Department offers courses in most areas of contemporary analytic philosophy including the theory of knowledge, metaphysics, logic, ethics, and political philosophy. In addition, upper division courses are offered in moral and political philosophy, and aesthetics, and in the philosophy of religion, of mind, of language, of mathematics, of law, and of the physical, biological and social sciences. The problems of philosophy have important roots in past. The history of philosophy is important not only as part of the heritage of educated persons, but also because it is relevant to contemporary issues. For these reasons, the department places great emphasis

on the history of philosophy, providing courses on the major figures and traditions of western philosophy.

**Career Alternatives.** Students of philosophy learn to understand and evaluate arguments and to think and write precisely and clearly. These analytical skills are assets in any career. Many of our majors have pursued graduate study in philosophy and have become philosophers in their own right. Others have pursued academic careers in related disciplines in the humanities and social sciences. Philosophy majors are well prepared for law, business, or other professional schools and have found careers in computer programming, government service, teaching, the ministry, and social work. Those wishing to attend law school or medical school should consider pursuing the Pre-Law and Pre-Med emphases, respectively.

## A.B. Major Requirements:

### General Emphasis

#### UNITS

#### Preparatory Subject Matter.....16

One course from any three of the following areas.....12

- (a) General Philosophy: Philosophy 1
- (b) Ancient Philosophy: Philosophy 21
- (c) Early Modern Philosophy: Philosophy 22
- (d) Philosophy of Mind: Philosophy 13G
- (e) Ethics: Philosophy 14, 15 or 24
- (f) Philosophy of Science: Philosophy 30, 31, 32 or 38
- (g) Philosophy of Language: Philosophy 17
- (h) Metaphysics: Philosophy 101
- (i) Theory of Knowledge: Philosophy 102

Philosophy 12.....4

#### Depth Subject Matter .....36

Upper division units in Philosophy .....36

Note: Philosophy 101 and 102 may not be counted toward both preparatory and depth subject matter units.

#### Total Units for the Major .....52

### Pre-Law Emphasis

#### UNITS

#### Preparatory Subject Matter.....16

One course from any of the following three:.....4

Philosophy 14, 15, or 16

Philosophy 5.....4

Philosophy 12.....4

Philosophy 24.....4

#### Depth Subject Matter .....36

Any three courses from the following six:.....12

Philosophy 102, 116, 118, 128, 189C, or 189F

Philosophy 112.....4

Philosophy 119.....4

Additional upper division elective units in philosophy .....

16

#### Total Units for the Major .....52

### Pre-Med Emphasis

#### UNITS

#### Preparatory Subject Matter.....16

One course from any of the following four:.....4

Philosophy 24, 30, 31, or 32

Philosophy 12.....4

Philosophy 15.....4

Philosophy 38.....4

#### Depth Subject Matter .....36

One course from any of the following four:.....4

Philosophy 107, 108, 128, 189I

Philosophy 112.....4

Philosophy 121.....4

Additional upper division elective units in philosophy .....

24

### Total Units for the Major .....52

Note: Admission to medical schools requires additional coursework not included in the Pre-Med Emphasis.

**Major Advisers.** G.J. Mattey, M. Oshana  
**Advising Office.** 101 Young Hall

### Minor Program Requirements:

Students wishing to minor in Philosophy may choose a general minor or a minor specializing in logic.

There are no specific courses required for the general minor, so students may create a program to suit their own interests. The range of choice in the logic specialization is limited to the courses listed.

#### UNITS

#### Philosophy—General .....20

Twenty upper division units in philosophy.

Philosophy 12 may be substituted for four of the upper division units.

#### Philosophy—Logic .....20

Philosophy 12 or Mathematics 108.....4

Philosophy 112.....4

Select units from Philosophy 113, 131, 134, 135, 189K.....12

**Minor Advisers.** G.J. Mattey, M. Oshana

**Honors Program.** The department offers an honors program, which gives qualifying majors the opportunity to work closely with faculty and graduate students.

**Courses for Non-Majors.** Students majoring in most disciplines in the university will find courses relevant to their educational or career goals. Philosophy 1 is the introductory course for non-majors. Philosophy 5 teaches critical thinking. The following courses are recommended:

(1) *Pre-law:* 12, 14, 24, 30, 102, 112, 115, 116, 118 and, especially, 119;

(2) *Pre-medical:* 14, 15, 30, 38, 108, 114, 115, 116;

(3) *Business:* 14, 102, 112, 114, 115, 116, 117, 118, 119;

(4) *Social Policy:* 14, 24, 101, 102, 114, 115, 116, 117, 118, 119, 120;

(5) *Social Sciences:* 12, 30, 31, 32, 101, 102, 103, 109, 118, 131;

(6) *Physical Sciences:* 12, 30, 31, 32, 101, 102, 107, 112, 131;

(7) *Biological Sciences:* 30, 31, 32, 38, 101, 102, 108, 120;

(8) *Humanities and the Arts:* 14, 21, 22, 24, 101, 102, 103, 105, 114, 116, 118, 123, 141 through 175;

(9) *Agricultural and Environmental Science and Policy:* 5, 14, 24, 30, 31, 114, 115, 116, 118, 120.

**Department Activities.** The Philosophy department sponsors a lecture series with well-known philosophers who present papers in their fields of expertise. The department also operates ongoing faculty and graduate student workshops. Undergraduate students are welcome to attend and join these discussions. Information can be obtained in the Department office.

**Graduate Study.** The Department of Philosophy offers programs of study leading to the M.A. and Ph.D. degrees. Detailed information may be obtained by writing to the Graduate Adviser.

**Graduate Adviser.** C. Gilmore

### Courses in Philosophy (PHI)

#### Lower Division

##### 1. Introduction to Philosophy (4)

Lecture—3 hours; discussion—1 hour. Problems of philosophy through major writings from various periods.

Problems are drawn from political, aesthetic, religious, metaphysical, and epistemological concerns of philosophy. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.)

### 5. Critical Reasoning (4)

Lecture—3 hours; discussion—1 hour. Criteria of good reasoning in everyday life and in science. Topics to be covered may include basic principles of deduction and induction; fallacies in reasoning; techniques and aids to reasoning; principles of scientific investigation; aids to clarity. Not open for credit to students who have completed course 6. GE credit: Wrt | WE.

### 7. Philosophical Perspectives on Sexuality (3)

Lecture—3 hours. Philosophical issues related to sexuality, including, but not limited to, ethical and social issues regarding sexual practice, orientation, classification and identity. GE credit: ArtHum | AH. —W. (W.) Sennet

### 7Y. Philosophical Perspectives on Sexuality (3)

Web virtual lecture—1.5 hours; discussion—1 hour. Philosophical issues related to sexuality, including, but not limited to, ethical and social issues regarding sexual practice, orientation, classification and identity. Not open for credit to students who have completed course 7. GE credit: ArtHum | AH, DD. —W. (W.) Sennet

### 10. Introduction to Cognitive Science (4)

Lecture/discussion—4 hours. Introduction to the interdisciplinary cognitive scientific approach to the study of mind, drawing concepts and methods from psychology, philosophy, linguistics, artificial intelligence, and other disciplines. GE credit: SciEng | SE, SL. —F. (F.) Molyneux

### 11. Asian Philosophy (4)

Lecture—3 hours; discussion—1 hour. Survey of the main philosophical systems of south and east Asia: Hinduism, Buddhism, Confucianism, and Taoism. Topics include the nature of reality, including God, the universe and the human self, human knowledge, and the proper conduct of human life. Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, WC, WE. —F. Mattey

### 12. Introduction to Symbolic Logic (4)

Lecture—3 hours; discussion—1 hour. Syntax and semantics of the symbolic language sentence logic. Syntax and semantics of the symbolic language sentence logic. Symbols of sentence logic. Translation between sentence logic and English. Truth table interpretation of sentence logic. Proof techniques. Application of truth tables and proof techniques to arguments in English. Not open for credit to students who have taken course 112, 113, 134, or 135 and passed with a grade of C or better. GE credit: AH. —F, Su. (F, Su.) Antonelli, Gilmore, Landry, Mattey

### 13. Minds, Brains, and Computers (3)

Lecture—3 hours. Computational theories of the nature of the mind. The mind as a computer process. The possibility of machine intelligence, consciousness, and mentality. Not open for credit for students who have completed course 13G for four units. GE credit: SciEng or SocSci | SE or SS, SL. —S. (S.) Molyneux

### 13G. Minds, Brains, and Computers with Discussion (4)

Lecture—3 hours; discussion—1 hour. Computational theories of the nature of the mind. The mind as a computer process. The possibility of machine intelligence, consciousness, and mentality. Not open for credit for students who have completed course 13. GE credit: ArtHum or SciEng | AH or SE, SL, WE. —S. (S.) Molyneux

### 14. Ethical and Social Problems in Contemporary Society (4)

Lecture—3 hours; discussion—1 hour. Philosophical issues and positions involved in contemporary moral and social problems. Possible topics include civil disobedience and revolution, racial and sex discrimination, environment, population control, technology and human values, sexual morality, freedom in society. GE credit: ArtHum, Div, Wrt | AH, WE.

**15. Introduction to Bioethics (4)**

Lecture—3 hours; discussion—1 hour. Critical analysis of normative issues raised by contemporary medicine and biology. Possible topics include euthanasia, abortion, reproductive technologies, genetic engineering, practitioner/patient relationships, allocation of medical resources, experimentation on human subjects. GE credit: ArtHum, Wrt | AH, WE.—Rulli

**16. Philosophical Foundations of American Democracy (4)**

Lecture—3 hours; discussion—1 hour. The philosophical underpinnings of democratic government and the tension between the goals of providing security and of preserving democracy and civil liberties. Illustration of the tension through focus on issues related to war and terrorism. GE credit: ACGH, AH, WE.—F. Copp

**17. Language, Thought, and World (4)**

Lecture—3 hours; discussion—1 hour. Puzzles in the philosophy of language, such as what language is, how language conveys thoughts, whether we each speak our own private language, and what we can learn about the world by studying language. GE credit: SocSci, Wrt | SS, WE.—May

**21. History of Philosophy: Ancient (4)**

Lecture—3 hours; discussion—1 hour. Survey of Greek philosophy with special attention to the Pre-Socratics, Plato, and Aristotle. GE credit: ArtHum, Wrt | WE.—Szaif

**22. History of Philosophy: Early Modern (4)**

Lecture—3 hours; discussion—1 hour. Survey of major figures in philosophy of the seventeenth and eighteenth centuries, with emphasis on Descartes, Hume, and Kant. GE credit: ArtHum, Wrt | WC.—W. (W.) Matthey

**24. Introduction to Ethics (4)**

Lecture—3 hours; discussion—1 hour. Reading of historical and contemporary philosophical works in ethics. Topics include the nature of morality, the justification of moral claims, and major ethical theories, such as consequentialist, deontological, and virtue theories. GE credit: ArtHum, Wrt | AH, WE.—S. (S.) Matthey, Oshana

**30. Introduction to Philosophy of Science (4)**

Lecture—3 hours; discussion—1 hour. Basic problems in the philosophy of science, common to the physical, biological, and social sciences. Analysis of explanation, confirmation theory, observational and theoretical terms, the nature of theories, operationalism and behaviorism, realism, reduction. Not open for credit to students who have taken course 104. GE credit: ArtHum or SciEng, Wrt | AH or SE, SL, WE.—Landry, Millstein

**31. Appraising Scientific Reasoning (4)**

Lecture—3 hours; discussion—1 hour. Introduction to scientific hypotheses and the kinds of reasoning used to justify such hypotheses. Emphasis on adequate justification, criteria, and strategies for distinguishing scientific from pseudoscientific theories. Concrete historical and contemporary cases. GE credit: ArtHum or SciEng | AH or SE, SL, WE.—Griesemer

**32. Understanding Scientific Change (4)**

Lecture—3 hours; discussion—1 hour. Concepts of scientific change in historical and philosophical perspective. Survey of models of growth of knowledge, 17th century to present. Relationship between logic of theories and theory choice. Kuhn's revolution model. Examples from various sciences. GE credit: ArtHum or SciEng, Wrt | AH or SE, WE.—Griesemer

**38. Introduction to Philosophy of Biology (4)**

Lecture—3 hours; discussion—1 hour. Non-technical introduction to philosophical, social, and scientific ideas, methods and technologies in contemporary biological fields such as evolution, genetics, molecular biology, ecology, behavior. Philosophical consideration of determinism, reductionism, explanation, theory, modeling, observation,

experimentation. Evaluation of scientific explanations of human nature. GE credit: ArtHum, Wrt | AH or SE, SL, WE.—Griesemer, Millstein

**98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division**

(Certain upper division courses may not be offered every year.)

**101. Metaphysics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy recommended. Theories of being. Such topics as reality, substance, universals, space, time, causality, becoming, body, experience, persons, freedom, and determinism. Views of the nature and method of metaphysics. Anti-metaphysical arguments. GE credit: ArtHum, Wrt | AH, WE.—Gilmore

**102. Theory of Knowledge (4)**

Lecture—3 hours; extensive writing; discussion. Prerequisite: one course in philosophy recommended. Analysis of the concept of knowledge. The relation between knowledge, belief and truth. Development of foundationalist, coherentist and externalist theories of justified belief. Examination of skepticism. GE credit: ArtHum, Wrt | AH, WE.—F. (F.) Matthey

**103. Philosophy of Mind (4)**

Lecture/discussion—3 hours; term paper. The relation between mind and body, our knowledge of other minds, and the explanation of mental acts. Discussion of such concepts as action, intention, and causation. GE credit: ArtHum, Wrt | AH, WE.—Molyneux

**104. The Evolution of Mind (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: one previous course in Philosophy recommended. The interpretation of human thought and behavior through the lens of evolutionary theory. Topics include the nature/nurture debate concerning cognitive and other mental capacities and traits, and the interaction between evolution, learning and development. GE credit: SocSci | SS, WE.—S. (S.) Matthey

**105. Philosophy of Religion (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy recommended. Logical, metaphysical, epistemological, and existential aspects of selected religious concepts and problems. GE credit: ArtHum, Wrt | AH, WE.—Gilmore, Szaif

**107. Philosophy of the Physical Sciences (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: one philosophy course or a science background recommended. Nature of testability and confirmation of scientific hypotheses; nature of scientific laws, theories, explanations, and models. Problems of causality, determinism, induction, and probability; the structure of scientific revolutions. GE credit: ArtHum or SciEng, Wrt | AH or SE, WE.—Landry, Molyneux

**108. Philosophy of the Biological Sciences (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: one course in biology or one course in philosophy recommended. Nature of biological theories, explanations, and models. Problems of evolutionary theory, ecology, genetics, and sociobiology. Science and human values. GE credit: ArtHum or SciEng, Wrt | AH or SE, SL, WE.—Griesemer, Millstein

**109. Philosophy of the Social Sciences (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy or a social science recommended. The nature of the social sciences, their subject matter and methods. Similarities to and differences from natural and life sciences. Predicting and explaining human behavior. Behaviorism. Reduction, holism, and individualism. Related moral issues. The social sciences and philosophy. GE credit: ArtHum or SocSci, Wrt | AH or SS, WE.

**111. Philosophy of Space and Time (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: one upper division philosophy course recommended. Philosophical problems of space and time. The philosophical implications of space-time theories, such as those of Newton and Einstein. Topics may include the nature of geometry, conventionalism, absolutist versus relationist views of space and time, philosophical impact of relativity theory. Offered in alternate years. GE credit: AH, WE.—W. (W.) Gilmore

**112. Intermediate Symbolic Logic (4)**

Lecture/discussion—4 hours. Prerequisite: course 12 or consent of instructor. Predicate logic syntax and semantics. Transcription between predicate logic and English. Proof techniques. Identity, functions, and definite descriptions. Introduction to concepts of metatheory. GE credit: AH.—W. (W.) Landry, Matthey

**113. Metalogic (4)**

Lecture/discussion—4 hours. Prerequisite: course 112, Mathematics 108, or the equivalent. The metalogic of classical propositional and first-order predicate logic. Consistency, soundness and completeness of both propositional and predicate logic. The Löwenheim-Skolem theorem for predicate logic. Undecidability of predicate logic. GE credit: AH.—(S.) Antonelli

**114. History of Ethics (4)**

Lecture/discussion—4 hours. Prerequisite: one previous philosophy course recommended. Study of some classic texts from the history of philosophical writing on central problems of ethics, taking the form either of a survey or concentrated examination of selected historical figures. Readings from such philosophers as Aristotle, Butler, Hume, Kant, Mill. GE credit: ArtHum, Wrt | WC.—Matthey, Oshana

**115. Problems in Normative Ethics (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: one previous course in philosophy recommended. Moral philosophy studied through examination of moral problems and the moral principles and common sense intuitions that bear on them. Problems discussed may include: animal rights, fetal rights, euthanasia, justice and health care, war, nuclear deterrence, world hunger, environmental protection. GE credit: ArtHum, Wrt | AH, WE.—S. (S.) Millstein

**116. Ethical Theories (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: one course in ethics recommended. Study of fundamental concepts and problems in ethical theory through an examination of classical and contemporary philosophical theories of ethics. Among the theories that may be discussed are utilitarianism, virtue theory, theories of natural rights, Kantian ethical theory, and contractarianism. GE credit: AH, WE.—W. (W.) Copp

**117. Foundations of Ethics (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 114, 115, 116, 101, or 137 recommended. Advanced investigation of questions about the nature and foundations of morality. Among the topics that may be discussed are moral realism and anti-realism, cognitivism and non-cognitivism, types of relativism, moral skepticism, normative language and normative belief. GE credit: AH, WE.—Copp

**118. Political Philosophy (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy. Intensive examination of some central concepts of political thought such as the state, sovereignty, rights, obligation, freedom, law, authority, and responsibility. GE credit: SocSci, Div, Wrt | AH, WE.—Oshana

**119. Philosophy of Law (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy or consent of instructor. Philosophical theories of the nature of law, legal obligation, the relation of law and morals. Problems for law involving liberty and justice: freedom of expression, privacy, rights, discrimination and fairness, responsibility, and punishment. GE credit: SocSci, Div, Wrt | AH, WE.—Oshana

**120. Environmental Ethics (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: one course in philosophy recommended. Conceptual and ethical issues concerning the environment. Extension of ethical theory to animals, all life, and ecosystem wholes. Topics may include contemporary environmental issues such as global warming, sustainability and biodiversity. Not open for credit for students who have completed course 115 prior to Fall 2011. GE credit: ArtHum | AH, WE.—Millstein

**121. Bioethics (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 15 recommended. In-depth coverage of topics in bioethics including resource allocation, measures of health and disease/disability, public health, and ethical issues related to research on human subjects and emerging technologies. GE credit: AH, WE.—Rulli

**123. Aesthetics (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. Nature of art, of artistic creation, of the work of art, and of aesthetic experience; nature and validity of criticism; relations of art to its environment. GE credit: ArtHum, Wrt | AH, WE.

**125. Theory of Action (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: one course in Philosophy recommended. Survey of prominent contemporary approaches to leading problems in action theory. Problems include issues about the nature of intentional action and the conceptual character of explanations of actions in terms of the agent's reasons. GE credit: ArtHum, Wrt | AH, WE.—Oshana

**128. Rationality (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: one course in philosophy recommended. Philosophical issues concerning rationality in its various forms. Focus is on theoretical and practical reasoning and conditions for rational belief, choice, and action. Possible additional topics include rationality and human limitations; paradoxes of rationality; varieties of irrationality; rationality and objectivity. GE credit: AH.—Lin

**129. Knowledge and the A Priori (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: one course in philosophy recommended. Self-evidence, intuition, the (in)fallibility and (in)defeasibility of priori methods. Analytic, formalist and Kantian accounts of how knowledge can be acquired through reasoning and intuition alone, without recourse to empirical methods. Offered in alternate years. GE credit: AH, WE.—S. Molyneux

**131. Philosophy of Logic and Mathematics (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 12 or one course for credit in mathematics. Nature of formal systems and mathematical theories. Selected topics include logical and semantic paradoxes; foundations of mathematics; set theory; type theory, and intuitionistic theory; philosophy of geometry; philosophical implications of Gödel's incompleteness results. GE credit: AH, WE.—Landry

**134. Modal Logic (4)**

Lecture/discussion—4 hours. Prerequisite: course 112 or Mathematics 108 or the equivalent. Survey of the main systems of modal logic, including Lewis systems S4 and S5. "Possible worlds" semantics and formal proofs. Applications to epistemology, ethics, or temporality. GE credit: AH.—Antonelli

**135. Alternative Logics (4)**

Lecture/discussion—4 hours. Prerequisite: course 12, Mathematics 108, or the equivalent. Alternatives to standard truth-functional logic, including many-valued logics, intuitionist logics, relevance logics, and non-monotonic logics. GE credit: AH.—Antonelli

**136. Formal Epistemology (4)**

Lecture/discussion—4 hours. Prerequisite: course 12. Formal (mathematical) approaches to belief revision, knowledge and deduction, meta-knowledge,

(multi-agent) epistemic logic, Bayesian confirmation, Bayes nets, epistemic and probabilistic paradoxes. Offered irregularly. GE credit: AH.—F. Molyneux

**137A. Philosophy of Language: Theory of Reference (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: one course in philosophy or linguistics recommended. Survey of issues and views concerning reference, or how words refer to things. Topics include names and descriptions, the distinction between sense and reference, the puzzle of non-referring terms, causal theories of reference, and possibility and necessity. Only two units of credit for students who have completed course 137. GE credit: AH, WE.—May, Sennet

**137B. Philosophy of Language: Truth and Meaning (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: one course in philosophy or linguistics recommended. Comparative treatment of theories about the relationship between truth and meaning. Topics include: the identification of meaning with truth conditions, the nature of propositions, theories of linguistic understanding, the roles of mind and world in determining meaning. Only two units of credit for students who have completed course 137. GE credit: AH, WE.—May, Sennet

**137C. Philosophy of Language: Semantics and Pragmatics (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: one course in philosophy or linguistics recommended. Philosophical issues and positions concerning the meaning and use of language. Topics include the distinction between meaning and implication, the roles of context and convention in language use, speaker meaning versus linguistic meaning and speech act theory. Only two units of credit for students who have completed course 137. GE credit: AH, WE.—May, Sennet

**141. Socrates and the Socratic Dialogue (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 21 recommended. The philosophy of Socrates as found in the Socratic dialogues of Plato. Topics include the Socratic practice of refutation, its method, epistemological foundation, and moral purpose; Socratic eudaimonism and Socratic virtue theory; the paradoxes of Socratic intellectualism. GE credit: AH, WE.—Szaif

**143. Hellenistic Philosophy (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 21 recommended. Positions and arguments of the major philosophical schools of the Hellenistic period: Stoicism, Epicureanism, and Scepticism. Focus is on ethical, epistemological and metaphysical questions and their interconnectedness. GE credit: AH, WE.—Szaif

**145. Medieval Philosophy (4)**

Lecture/discussion—4 hours. Prerequisite: course 21 recommended. Major philosophers in the medieval Christian, Islamic, and Jewish traditions. Offered in alternate years. GE credit: AH, WC.—Szaif

**151. Nineteenth Century European Philosophy (4)**

Lecture/discussion—4 hours. Prerequisite: course 22 recommended. Survey of the main movements in nineteenth century philosophy on the European continent. Idealism in Schopenhauer and Hegel, dialectical materialism in Marx, irrationalism in Kierkegaard, Nietzsche and Dostoevsky. Offered irregularly. GE credit: ArtHum | AH, WE.—W. (W.) Matthey

**156. Contemporary Analytic Philosophy (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. Consideration of central issues such as meaning/reference, analytic/synthetic, reductionism, formal and ordinary language, essential properties, ontological commitment, possible world semantics; influential works by philosophers such as Russell, Moore, Wittgenstein, Austin, Carnap, Quine, Putnam, Kripke, van Fraassen. GE credit: AH, WE.

**157. Twentieth Century European Philosophy (4)**

Lecture/discussion—4 hours. Prerequisite: one course in philosophy recommended. Survey of the main movements in twentieth century philosophy on the European continent, including phenomenology, existentialism, post-structuralism and post-modernism. Philosophers covered are Husserl, Heidegger, Sartre, Foucault, Derrida. GE credit: ArtHum | AH, WE.—Matthey

**160. Pre-Socratics (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 21 recommended. Study of the metaphysical views of such pre-Socratic figures as the Milesians, the Pythagoreans, Heraclitus, Parmenides, Empedocles, Anaxagoras, and the atomists. GE credit: AH, WE.—Szaif

**161. Plato (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 21 recommended. Examines Plato's most important contributions in metaphysics, epistemology, psychology, cosmology, ethics and political philosophy. Dialogues will be selected from Plato's middle and later writings. Offered in alternate years. GE credit: AH, WE.—Szaif

**162. Aristotle (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 21 recommended. An overview of Aristotle's most central and influential writings. Topics selected from fields such as metaphysics, physics, ethics, logic, and psychology. GE credit: AH, WE.—Szaif

**168. Descartes (4)**

Lecture/discussion—4 hours. Prerequisite: course 22 recommended. The philosophical writings of René Descartes. Topics include the refutation of skepticism, the nature and existence of mind and body, the existence of God, and the foundations of science. Offered irregularly. GE credit: AH, WE.—Matthey

**170. Spinoza and Leibniz (4)**

Lecture/discussion—4 hours. Prerequisite: course 22 recommended. Seventeenth-century philosophical writings of Spinoza and Leibniz. Topics drawn from both philosophers include: the nature and existence of God, the nature of mind, the relation between mind and body, human freedom, metaphysical monism vs. pluralism. Offered in alternate years. GE credit: ArtHum | AH, WE.—F. Matthey

**172. Locke and Berkeley (4)**

Lecture/discussion—4 hours. Prerequisite: course 22 recommended. Principal metaphysical works of John Locke and George Berkeley. Topics include abstract ideas, existence of matter, primary and secondary qualities, essence, substance, the existence of God, and the nature of scientific knowledge. May be repeated for credit. Offered irregularly. GE credit: AH, WE.—W. (W.) Matthey

**174. Hume (4)**

Lecture/discussion—4 hours. Prerequisite: course 22 recommended. David Hume's *Treatise of Human Nature* and related writings. Topics include empiricism, space, causality, belief, skepticism, the passions, and morality. Offered irregularly. GE credit: AH, WE.—Matthey

**175. Kant (4)**

Lecture/discussion—4 hours. Prerequisite: course 22 recommended. Immanuel Kant's *Critique of Pure Reason* and related writings. Topics include the nature of human cognition, space and time, *a priori* concepts, substance, causality, human freedom, and the existence of God. Offered irregularly. GE credit: AH, WE.—S. (S.) Matthey

**178. Frege (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: one upper-division course in philosophy recommended; consent of instructor. Development of Gottlob Frege's views about language and logic. Formulation of his grand mathematical idea known as logicism and how it led to the philosophy of language. GE credit: AH, WE.—May

**189A. Special Topics in Philosophy; History of Philosophy (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: one course in the area of the special topic recommended. Special topics in History of Philosophy. May be repeated up to eight units of credit. GE credit: ArtHum | AH, WE.—Mattey, Szafir

**189B. Special Topics in Philosophy (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: one course in the area of the special topic recommended. Special topics in Metaphysics. May be repeated up to eight units of credit. GE credit: ArtHum | AH, WE.—W. (W.) Gilmore

**189C. Special Topics in Philosophy; Theory of Knowledge (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: one course in the area of the special topic recommended. Special topics in Theory of Knowledge. May be repeated up to eight units of credit. GE credit: WE.—S. (S.) Mattey, Molyneux

**189D. Special Topics in Philosophy; Ethics (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: one course in the area of the special topic recommended. Special topics in Ethics. May be repeated up to eight units of credit. GE credit: ArtHum | AH, WE.—Copp, Oshana

**189E. Special Topics in Philosophy; Political Philosophy (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: one course in the area of the special topic recommended. Special topics in Political Philosophy. May be repeated up to eight units of credit. GE credit: ArtHum | AH, WE.—Oshana

**189F. Special Topics in Philosophy; Philosophy of Law (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: one course in the area of the special topic recommended. Special topics in Philosophy of Law. May be repeated up to eight units of credit. GE credit: ArtHum | AH, WE.—Oshana

**189G. Special Topics in Philosophy; Aesthetics (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: one course in the area of the special topic recommended. Aesthetics. May be repeated up to eight units of credit. GE credit: ArtHum | AH, WE.

**189H. Special Topics in Philosophy; Philosophy of Mind (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: one course in the area of the special topic recommended. Special topics in Philosophy of Mind. May be repeated up to eight units of credit. GE credit: ArtHum | AH, WE.—Molyneux

**189I. Special Topics in Philosophy; Philosophy of Science (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: one course in the area of the special topic recommended. Special topics in Philosophy of Science. May be repeated up to eight units of credit. GE credit: ArtHum or SocSci | AH or SE, WE.—Griesemer, Landry, Millstein

**189J. Special Topics in Philosophy; Philosophy of Language (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: one course in the area of the special topic recommended. Special topics in Philosophy of Language. May be repeated up to eight units of credit. GE credit: ArtHum | AH.—May, Sennet

**189K. Special Topics in Philosophy; Logic (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: one course in the area of the special topic recommended. Special topics in Logic. May be repeated up to eight units of credit. GE credit: ArtHum | AH.—S. (S.)

**194HA. Honors Research Project (4)**

Tutoring—3 hours; term paper. Prerequisite: consent of instructor; open to students who are members of the honors program in Philosophy. Completion of honors research project under direction of an instruc-

tor. Consult departmental major adviser for list of instructors available in a given quarter.—F, W, S. (F, W, S.)

**194HB. Honors Research Project (4)**

Tutoring—3 hours; term paper. Prerequisite: consent of instructor; open to students who are members of the honors program in Philosophy. Completion of honors research project under direction of an instructor. Consult departmental major adviser for list of instructors available in a given quarter.—F, W, S. (F, W, S.)

**198. Directed Group Study (1-5)**

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate****200A. Proseminar I (4)**

Seminar—3 hours; term paper. Prerequisite: consent of instructor. Open only to students in their first quarter of the Philosophy Ph.D. program. Intensive study of core works in a selected area of philosophy. Intensive experience in philosophical writing, discussion, and presentation of written work.—F. (F.)

**200B. Proseminar II (4)**

Seminar—3 hours; term paper. Prerequisite: consent of instructor. Limited enrollment. Open only for students in their first quarter of Philosophy Ph.D. program. Intensive study of core works in a selected area of philosophy. Intensive experience in philosophical writing, discussion, and presentation of written work.—F. (F.)

**201. Metaphysics (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Topics vary from quarter to quarter and may include the following: What are things? Do names refer to things? If so, how? Do things have essential properties? What is the nature of necessity? May be repeated for credit when topic differs and with consent of instructor.—Gilmore

**202. Theory of Knowledge (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing in philosophy or consent of instructor. Topics vary from quarter to quarter. Sample topics include belief, skepticism, justification, externalism, naturalized epistemology. May be repeated for credit with consent of instructor.—Mattey, Molyneux

**203. Philosophy of Mind (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Topics in the philosophy of mind such as the mind-body problem, mental representation, consciousness, intentionality. May be repeated for credit with consent of instructor.—Molyneux

**203P. Philosophy of Mind Practicum (4)**

Practicum—12 hours. Prerequisite: consent of instructor. Specific research conducted and prepared for publication by advanced students in a team setting. Topics include knowledge representation and learning in neural networks, the nature and formal properties of mental representation. May be repeated for credit when topic differs and with consent of instructor. (S/U grading only.)

**207. Philosophy of Physics (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing in Philosophy or consent of instructor. Intensive treatment of one (or more) topic(s) in the philosophy of physics, such as foundations of space-time theories, the interpretation of quantum mechanics, or foundations of statistical mechanics. May be repeated for credit when topic differs and with consent of instructor.—Landry

**208. Philosophy of Biology (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Intensive treatment of one (or more) topic(s) in the philosophy of biology, such as foundations of evolutionary theories, reductionism in biology, sociobiology and cul-

tural evolution. May be repeated for credit when topic differs and with consent of instructor.—Griesemer, Millstein

**210. Philosophy of Science (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Treatment of one or more general topics of current interest in philosophy of science. Topics may include scientific explanation, theories of confirmation, scientific realism, reduction in physics and biology. May be repeated for credit when topic differs and with consent of instructor.—Griesemer, Landry, Millstein

**212. Philosophy of Logic and Mathematics (4)**

Seminar—3 hours; term paper. Prerequisite: course 112 or 113 or Mathematics 108 or 125 or the equivalent. Philosophical issues in logic and math. Topics may include nature of logical and mathematical truth or knowledge, correctness of logical systems, foundations of mathematics, metaphysical and epistemological presuppositions, applications to philosophical problems and formalization of philosophical theories. May be repeated for credit when topic differs and with consent of instructor.—Antonelli, Landry

**213. Advanced Logic for Graduate Students (4)**

Lecture/discussion—3 hours; extensive problem solving. Prerequisite: graduate standing in Philosophy. Enrollment in the Philosophy Ph.D. program. Intensive study of advanced logic, including set theory, metatheory of predicate logic, and modal logic. May be repeated two times for credit when topic differs.—F. (F.) Antonelli, Mattey

**214. Ethics (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing in philosophy or consent of instructor. Topics may include morality and motivation, objectivity in ethics, the relationship between the factual and the moral. Topics vary from quarter to quarter. May be repeated for credit when topic differs and with consent of instructor.—Copp, Oshana

**217. Political Philosophy (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Advanced studies in political philosophy. Topics vary but may include distributive justice, enforcement of morality by the state, equality, obligation to obey the law, social contract theory. May be repeated for credit when topic differs and with consent of instructor.—Copp, Oshana

**220. Environmental Ethics (4)**

Lecture—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Intensive treatment of one or more topic(s) in environmental ethics, such as biodiversity, sustainability, composition of the moral community, invasive species, endangered species, applications of ethical theories to contemporary environmental issues.—Millstein

**237. Philosophy of Language (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of philosophical issues raised by language, such as the nature of semantic content, proper semantics for verbs of propositional attitude, feasibility and limitations of formal semantics and pragmatics for natural languages. May be repeated for credit when topic differs and with consent of instructor.—May, Sennet

**238. Philosophy of Language Workshop (4)**

Seminar—3 hours; extensive writing. Open to graduate students only. Discussion of recently published, unpublished and in-progress research in philosophy of language, including work on the relation of language and mind, of language and logic, and linguistic theory. May be repeated for credit when topic differs.—May

**261. Plato (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Advanced seminar designed for analysis of arguments, doctrines, and texts from Plato's works. Methods of argumenta-

tion and interpretation are especially stressed. Topics vary according to instructor. May be repeated for credit with consent of instructor.—Szaif

#### **262. Aristotle (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Advanced seminar designed for analysis of arguments, doctrines, and texts from Aristotle's works. Methods of argumentation and interpretation are especially stressed. Topics vary according to instructor. May be repeated for credit with consent of instructor.—Szaif

#### **275. Kant (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing in philosophy or consent of instructor. Intensive study of a topic in the philosophy of Kant, in such areas as metaphysics, theory of knowledge, ethics. May be repeated for credit with consent of instructor.—Mattey

#### **290. History of Philosophy (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Topics in the history of philosophy. Topics vary according to instructor from quarter to quarter. May be repeated for credit when topic differs with consent of instructor.—Mattey, Szaif

#### **298. Group Study (1-5)**

#### **299. Research (1-12)**

(S/U grading only.)

#### **Professional**

#### **396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## **Physical Education**

(College of Letters and Science)

Barbara Jahn, M.S., Program Director

**Program Office.** 264 Hickey Gymnasium  
530-752-1111

#### **Committee in Charge**

Keith Baar, Ph.D.  
(*Neurobiology, Physiology, and Behavior*)

Sue Bodine, Ph.D.  
(*Neurobiology, Physiology, and Behavior*)

Barbara A. Jahn, M.S. (*Physical Education*)  
Susan Kauzlarich, Ph.D. (*Chemistry*)

Academic Senate Distinguished Graduate  
Mentoring Award

Tonya Kuhl, Ph.D. (*Chemical Engineering and  
Materials Science*)

Ronald Manara, M.S. (*Physical Education*)  
Dwayne Shaffer, M.A.  
(*Physical Education/Intercollegiate Athletics*)

#### **Faculty**

Barbara A. Jahn, M.S., Supervisor

#### **Affiliated Faculty**

Lloyd Acosta, M.Ed, Lecturer/Coach

Carissa Adams, Ph.D., Lecturer

Alex Antipa, B.S., Lecturer

Erin Bridges-Thorpe, M.B.A., Lecturer/Coach

Stephen T. Bronzan, M.S., Lecturer/Assistant  
Director

Greg Chapla, B.A., Lecturer

Daniel Connors B.A., Lecturer/Coach

Rozanne DeWeese, M.A., Lecturer

Steven Doten, Ph.D., Lecturer

Adam Getchell, M.S., Lecturer

Ron Gould, B.A. Lecturer/Coach

Yajun Graves, B.S., Lecturer

Jennifer Gross, M.A., Lecturer/Coach

Rick Henderson, B.S., Lecturer

Sara Jackson, M.S., Lecturer/Coach

Mark Johnson, M.S., Lecturer

Twila Kaufman, M.A., Lecturer/Coach

Andrea Khoo, B.S., Lecturer

Christine Kilroe, B.S., Lecturer/Coach

Theresa Ladouceur, B.S. Lecturer/Coach

John Lavallee, M.Ed., Lecturer/Coach  
Daryl Lee, M.S., Lecturer  
James Les, B.S. Lecturer/Coach  
Daniel Leyson, M.A., Lecturer/Coach  
Ron Manara, M.S., Lecturer  
Bill Maze, M.B.A., Lecturer/Coach  
Peter Motekaitis, M.A., Lecturer/Coach  
Kevin Nosek, M.S., Lecturer/Coach  
Maryclare Robinson, M.S., Lecturer  
Dwayne Shaffer, M.A., Lecturer/Coach  
Sandy Simpson, M.S., Lecturer  
Eric Steidlmayer, J.D., Lecturer/Coach  
Anna Temple, B.A., Lecturer/Coach  
Lisa Varnum, B.S., Athletic Trainer/Lecturer  
Matt Vaughn, M.A., Lecturer/Coach  
Cy Williams, M.A.T., Lecturer/Coach  
Jamey Wright, J.D., Lecturer/Coach  
Karen Yoder, M.A., Lecturer/Coach  
Karen Zufelt, Ph.D., Lecturer

#### **The Program of Study**

The Program in Physical Education facilitates the development and offering of non-major courses related to physical activities and education, fitness and health, athletic training, teacher education, and organized sport. The Program is available as part of a student's general educational experience to enhance and broaden the understanding and experience of physical activity in the maintenance of lifetime health and fitness.

The basic activities series includes Physical Education 1, fitness, lifetime, and sports skills. The PE 1 activity courses are instructional in nature, designed to introduce new skills to beginners or to improve existing skills. Physical Education 6 is offered for students participating in intercollegiate athletics. Additional lower division courses include those in special skill areas, such as life-saving and water safety, health and fitness, and athletic training. Upper division courses include advanced classes in coaching, sociology of sports, and a series of courses that meet the mandated requirements for students pursuing teacher preparation and certification.

**Teaching Credential Subject Representative.**  
Barbara Jahn

**Class and Recreational Use of Facilities.** The incidental fee payable by all students at the time of registration entitles students to the use of the gymnasium, pool, showers, tennis courts, and athletic fields. Fines are imposed for each formal transaction necessitated by failure of the student to comply with the regulations of the program.

#### **Courses in Physical Education (PHE)**

#### **Lower Division**

#### **1. Physical Activities (0.5)**

Laboratory—2 hours. Physical Education Activities classes offered in the following areas: aquatics, personal fitness, martial arts, individual sports, and team sports. These academic classes are instructional rather than recreational and are intended to improve activity specific skills and knowledge. May be repeated, along with course 6, for a combined total of 6 units. Credit limited to 6 units in combination with course 6. (P/NP grading only.)—F, W, S. (F, W, S.)

#### **6. Preparation and Participation in ICA Competition (1)**

Practice—3 hours. Prerequisite: consent of instructor (head coach). Classes offered in all UC Davis inter-collegiate athletic sports and are restricted to student-athletes who are members. May be repeated, along with course 1, for a combined total of 6 units. (P/NP grading only.)—F, W, S. (F, W, S.)

#### **7. Professional Physical Education Activities: Men and Women (1)**

Lecture—1 hour; or laboratory—2 hours. Fundamental skills for: (a) coaching competitive athletics; (b) classroom teaching and coaching, and (c) classroom teaching and officiating. May be repeated for a total of six units.—F, W. (F, W.)

#### **8. Student-Athlete Life Skills (1)**

Lecture—1 hour. Prerequisite: consent of instructor. Open to intercollegiate student-athletes only. For intercollegiate student-athletes. Balancing academic and athletic demands. Academic, psychological, and sociocultural issues which influence success as a college student-athlete. (P/NP grading only.)—F, W. (F, W.)

#### **15. Administration of Intramural Sports (2)**

Lecture—2 hours. Planning and administering intramural sports programs at the high school and college level.

#### **25. Theory of Lifesaving and Water Safety (2)**

Lecture—1 hour; laboratory—2 hours. Prerequisite: sound physical condition, and no physical handicap that would render student unable to perform the required skills and ability to pass preliminary swimming test. Provides the student with the knowledge, organizational procedures, and skill development necessary to provide for water safety and save his/her own life or the life of another in an aquatic emergency. (American Red Cross Advanced Lifesaving Certificate awarded upon successful completion of necessary requirements.)—S. (S.) Jahn

#### **27. Training Course for Water Safety Instructors (2)**

Lecture—1 hour; laboratory—2 hours. Prerequisite: advanced swimming (course 1) or consent of instructor; course 5 and current Advanced Life-Saving Certificate. Theoretical knowledge and practical experience necessary for the organization and teaching of swimming and lifesaving classes. (American Red Cross Water Safety Instructor's Certificate awarded upon successful completion of necessary requirements.)—S. (S.) Jahn

#### **40. Drugs and Society (2)**

Lecture—2 hours; fieldwork—2 hours total; film-viewing—5 hours total. Pharmacology, methods of use, and effects of use of psychoactive and performance-enhancing drugs. Historical overview of drug use. Identification of behavior of "at-risk" and "user" populations. (P/NP grading only.)—W, Su. (W, Su.) Manara, Simpson

#### **44. Principles of Healthful Living (2)**

Lecture—2 hours. Application of scientific and empirical knowledge to personal, family, and community health problems. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.) Adams, Bronzan, Manara, Wright

#### **92. Physical Education Internship (1-5)**

Internship—3-15 hours; written project proposal and evaluation. Prerequisite: consent of instructor; enrollment dependent on availability of intern positions, with priority given to Exercise Biology majors. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under department faculty supervision. May be repeated for credit once but no internship units will be counted toward Exercise Biology major. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **97T. Tutoring in Physical Education (1-5)**

Tutorial—1-5 hours. Prerequisite: lower division standing and consent of Program Director. Tutoring of students in lower division physical activity courses. Weekly meetings with instructor in charge of courses. Written reports on methods and materials required. May be repeated one time for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

#### **97TC. Tutoring in the Community (1-5)**

Tutorial—2-15 hours; discussion—1 hour. Prerequisite: lower division standing and consent of Program Director. Tutoring in the community in physical activity related projects under the guidance of the Physical Education faculty. Regular meetings with instructor in charge and written report required. May be repeated one time for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

#### **98. Directed Group Study (1-5)**

Prerequisite: consent of instructor and Program Director. (P/NP grading only.)—F, W, S. (F, W, S.)

**99. Special Study for Undergraduates (1-5)**  
(P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

## Upper Division

### 100. Field Experience in Teaching Physical Education (2)

Lecture—1 hour; fieldwork—4 hours. Prerequisite: upper division standing and appropriate course 1 or 7. Tutoring or teacher's aide in physical education activities, including athletic coaching, in public schools under the guidance of a regular teacher with supervision by a departmental faculty person. May be repeated one time for credit. (P/NP grading only.)—F. (F.)

### 120. Sport in American Society (3)

Lecture—3 hours. Sociological approaches to the study of sport and contemporary American culture, including sport interaction with politics, economics, religion, gender, race, media and ethics. Socialization factors involving youth, scholastic, collegiate, and Olympic sport. (Same course as Exercise Biology 120.) GE credit: SocSci, Div I SS. —F, W, S, Su. (F, W, S, Su.) Adams, Bronzan, Doten, Simpson

### 131. Physical Activity and the Disabled (4)

Lecture—3 hours; laboratory—3 hours. The study of the diverse and complex nature of individuals with disabilities and how they adapt to their disabilities in daily living. Integration of individuals with disabilities into the community, schools, and physical activity and recreational programs. Not open for credit to students who have completed Exercise Biology 131.

### 133. Prevention and Care of Sports Injuries (3)

Lecture—2 hours; laboratory—3 hours. Prerequisite: Cell Biology and Human Anatomy 101 (may be taken concurrently). Prevention, care, and rehabilitation of injuries incurred by athletes. Laboratory on anatomy, emergency care, physical therapy methods, and taping techniques. Not open for credit to students who have completed Exercise Biology 133.—Su. (Su.)

### 135. Advanced Procedures in Evaluation and Management of Athletic Injuries (3)

Lecture—3 hours. Prerequisite: course 133 or Exercise Biology 133, Cell Biology and Human Anatomy 101, consent of instructor. Advanced study of the evaluation and management of athletic injuries, including mechanism of injury, biomechanics and pathophysiology. Current topics in athletic training. Not open for credit to students who have completed Exercise Biology 135.—Su. (Su.)

### 141. Coaching Principles and Methods (3)

Lecture/discussion—3 hours. Prerequisite: upper-division standing; course 143. Technical, tactical, and strategic aspects of coaching. Methods for organizing and delivering effective information in coaching. Biomechanical basis of motor skills and motor learning principles applied to coaching. Classroom development of coaching skills and outside observations of coaching required.—S. (S.) Bronzan, Jackson, Motekaitis

### 142. Physical Education in the Public Schools (3)

Lecture—3 hours. Analysis and study of the principles and methods basic to teaching physical education at the elementary and secondary levels.

### 143. Coaching Effectiveness (3)

Lecture—3 hours. Prerequisite: upper division standing; 3 units of courses 1 and 6 combined. Synthesis and application of basic components of sport psychology, sport pedagogy, and sport physiology and basic management and administration of athletics in public high schools. (P/NP grading only.)—F. (F.) Bronzan

### 144. Principles of Health Education (2)

Lecture—2 hours. Prerequisite: course 44 and upper division standing or consent of instructor. Principles of teaching health education in the public schools. (P/NP grading only.)—S. (S.)

### 150. Recreation in the Community (3)

Lecture—2 hours; discussion—1 hour; two Saturday field trips—8 hours. The nature and scope of community recreation programs in California emphasizing low income, highly populated areas, and poor rural communities.

### 192. Physical Education Internship (1-12)

Internship—3-36 hours; written project proposal and evaluation. Prerequisite: upper division standing and consent of instructor; enrollment dependent on availability of intern positions, with priority given to Exercise Science majors. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under department faculty supervision. May be repeated for a total of 12 units (including course 92) but no internship units will be counted toward Exercise Science major. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.) Adams, Bronzan, Doten, Simpson

### 197T. Tutoring in Physical Education (1-5)

Tutorial—1-5 hours. Prerequisite: consent of chairperson. Tutoring of students in lower division physical activity courses. Written reports on methods and materials required. May be repeated one time for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

### 197TC. Tutoring in the Community (1-5)

Tutorial—2-15 hours; discussion—1 hour. Prerequisite: upper division standing and consent of Department Chairperson. Tutoring in the community in physical education related projects under the guidance of the Physical Education faculty. Regular meetings with instructor in charge and written report required. May be repeated one time for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

### 198. Directed Group Study (1-5)

Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.)—F, W, S. (F, W, S.)

### 199. Special Study for Advanced Undergraduates (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

## Professional

### 300. The Elementary Physical Education Program (2)

Lecture—1 hour; laboratory—2 hours. Prerequisite: consent of instructor. Restricted to senior standing or credential student. Introduction to principles, theories, material, and practices of elementary school physical education program.—S. (S.) Bronzan, Jackson, Motekaitis

### 380. Methods of Teaching Physical Education (3)

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 142 and six units of course 7; or consent of instructor. The methods of teaching group and individual activities for grades K-12; program planning, class management, organization, and evaluation. (P/NP grading only.)—W. (W.)

## Physical Medicine and Rehabilitation

See **Medicine, School of, on page 427.**

## Physics

(College of Letters and Science)

Andreas Albrecht, Ph.D., Chairperson of the Department

Lori Lubin, Ph.D., Vice Chairperson of the Department (Administration and Undergraduate Matters)

Rena Zieve, Ph.D., Vice Chairperson of the Department (Graduate Matters)

## Department Office. 174 Physics Building

530-752-1500; <http://www.physics.ucdavis.edu>

## Faculty

Andreas J. Albrecht, Ph.D., Distinguished Professor  
Robert H. Becker, Ph.D., Distinguished Professor  
Patricia C. Boeshaar, Ph.D., Senior Lecturer  
Marusa Bradac, Ph.D., Associate Professor  
Manuel Calderon de la Barca Sanchez, Ph.D., Professor

Steven Carlip, Ph.D., Professor  
Daniel A. Cebra, Ph.D., Professor  
Hsin-Chia Cheng, Ph.D., Professor  
Maxwell B. Chertok, Ph.D., Professor  
Shirley Chiang, Ph.D., Professor

*Academic Senate Distinguished Teaching Award*

John Conway, Ph.D., Professor  
Daniel L. Cox, Ph.D., Distinguished Professor

James Crutchfield, Ph.D., Professor

Nicholas Curro, Ph.D., Professor

Sergey Dubovsky, Ph.D., Associate Professor

Robin Erbacher, Ph.D., Professor

Charles S. Farley, Ph.D., Distinguished Professor

Christopher D. Fassnacht, Ph.D., Professor

Daniel Ferenc, Ph.D., Professor

Ching-Yao Fong, Ph.D., Distinguished Professor

John F. Gunion, Ph.D., Distinguished Professor

Veronica Hubeny, Ph.D., Professor

Nemanja Kaloper, Ph.D., Professor

Lloyd E. Knox, Ph.D., Professor

Kai Liu, Ph.D., Professor

Lori Lubin, Ph.D., Professor

Markus Luty, Ph.D., Professor

Michael Mulhearn, Ph.D., Assistant Professor

Emilija Pantic, Ph.D., Assistant Professor

Warren E. Pickett, Ph.D., Distinguished Professor

Mukund Rangamani, Ph.D., Professor

John B. Rundle, Ph.D., Distinguished Professor

Sergey Savrasov, Ph.D., Professor

Richard T. Scalettar, Ph.D., Professor

Rajiv R.P. Singh, Ph.D., Professor

Robert Svoboda, Ph.D., Professor

John Terning, Ph.D., Professor

S. Mani Tripathi, Ph.D., Professor

Jaroslav Trnka, Ph.D., Assistant Professor

J. Anthony Tyson, Ph.D., Distinguished Professor

David J. Webb, Ph.D., Senior Lecturer

David Wittman, Ph.D., Associate Professor

Dong Yu, Ph.D., Associate Professor

Xiangdong Zhu, Ph.D., Professor

Rena J. Zieve, Ph.D., Professor

Gergely Zimanyi, Ph.D., Professor

*Academic Senate Distinguished Teaching Award*

## Emeriti Faculty

Franklin P. Brady, Ph.D., Professor Emeritus

Thomas A. Cahill, Ph.D., Professor Emeritus

Ling-Lie Chau, Ph.D., Professor Emerita

Lawrence B. Coleman, Ph.D., Professor Emeritus

*Academic Senate Distinguished Teaching Award*

Linton R. Corruccini, Ph.D., Professor Emeritus

James E. Draper, Ph.D., Professor Emeritus

Glen W. Erickson, Ph.D., Professor Emeritus

Claude Garrod, Ph.D., Professor Emeritus

James P. Hurley, Ph.D., Professor Emeritus

Joseph E. Kiskis, Ph.D., Professor Emeritus

Winston T. Ko, Ph.D., Professor Emeritus

Barry M. Klein, Ph.D., Professor Emeritus

Richard L. Lander, Ph.D., Distinguished Professor Emeritus

Douglas W. McColm, Ph.D., Senior Lecturer Emeritus

*Academic Senate Distinguished Teaching Award*

David E. Pellett, Ph.D., Professor Emeritus

David Pines, Ph.D., Distinguished Research Professor

Wendell H. Potter, Ph.D., Senior Lecturer Emeritus

*Academic Senate Distinguished Teaching Award*

Philip M. Yager, Ph.D., Professor Emeritus

## Affiliated Faculty

Albert De Roeck, Ph.D., Adjunct Professor

Harry B. Radousky, Ph.D., Adjunct Professor

Ramona Vogt, Ph.D., Adjunct Professor

Tom Weideman, Ph.D., Lecturer

Dina Zhabinskaya, Ph.D., Lecturer

## The Major Program

From the smallest subatomic particles to atoms, molecules, stars, and galaxies, the study of physics is the study of what makes the universe work. Knowledge gained using atomic-scale microscopes and high-energy particle accelerators and nuclear reactors teaches us not only what holds the atomic nucleus together but also how proteins function and why stars shine.

**The Program.** The Department of Physics offers a Bachelor of Arts in Physics and two Bachelor of Science degree programs: in Physics (which also offers an emphasis in Astrophysics), and in Applied Physics. The A.B. degree provides a broad coverage of classical and modern physics while permitting a broader liberal arts education than is possible with the other two programs. The B.S. degree in either Physics or Applied Physics should be followed by the student who plans to enter physics as a profession, and also provides excellent training for a wide variety of technical career options. The B.S. in Applied Physics provides the student with a solid introduction to a particular applied physics specialty. For the student who plans to enter the job market upon completing a B.S. degree, the applied physics orientation would be an asset. Either B.S. program provides a solid foundation in physics for the student interested in graduate work in either pure or applied physics.

**Career Alternatives.** Careers in physics and applied physics include research and development, either in universities, government laboratories, or industry; teaching in high schools, junior colleges, and universities; management and administration in industrial laboratories and in government agencies; and in production and sales in industry. A major in physics also provides a strong base for graduate-level work in such interdisciplinary areas as chemical physics, biophysics and medical physics, geophysics and environmental physics, astrophysics and astronomy, computer science, and materials science.

## Physics

### A.B. Major Requirements:

#### UNITS Preparatory Subject Matter.....41-47

Physics 9A, 9B, 9C, 9D or 9HA, 9HB,  
9HC, 9HD, 9HE ..... 19-25  
Mathematics 21A, 21B, 21C, 21D, 22A,  
22B ..... 22

#### Depth Subject Matter .....35-37

Physics 104A, 105A, 110A, 110B, 112,  
115A, 122A or 122B ..... 28  
At least one course from: 129A, 130A,  
140A, 151, 152, or 153 ..... 4  
Physics 102 (1 unit) waived if 104B  
taken ..... 0-1  
At least one additional fixed-unit upper  
division Physics course excluding 160 ... 3-4

#### Total Units for the Major .....76-84

### B.S. Major Requirements:

#### UNITS Preparatory Subject Matter.....50-56

Physics 9A, 9B, 9C, 9D or 9HA, 9HB,  
9HC, 9HD, 9HE ..... 19-25  
Mathematics 21A, 21B, 21C, 21D,  
22A, 22B ..... 22  
Computer Science Engineering 30 (or  
equivalent programming course) ..... 4  
Chemistry 2A or 2HA (2B-2C or  
2HB-2HC highly recommended) ..... 5

#### Depth Subject Matter .....56-64

Physics 104A, 105A, 105B, 110A,  
110B, 110C, 112, 115A, 115B ..... 36  
Physics 102 (1 unit) or 104B ..... 1-4  
Laboratory Requirement ..... 4-12  
Physics 122A or 122B or 116A, B and C  
Concentration Courses ..... 12  
Two courses from one specialty (General  
Relativity/Astrophysical Applications,  
Condensed Matter, or Nuclear/Particle

Physics) and one course from a different specialty. Lists of courses in each specialty are available from the department

Additional upper division Physics courses excluding 160, for a total of 15 upper division Physics courses of three or more units each. With prior departmental approval, one course from mathematics, engineering, or natural science may be used to meet this requirement. May include only one course from: 194H, 195, 198, 199 ..... 0-9

#### Total Units for the Major .....109-118

## Astrophysics Emphasis

#### UNITS Preparatory Subject Matter.....50-56

Physics 9A, 9B, 9C, 9D or 9HA, 9HB,  
9HC, 9HD, 9HE ..... 19-25  
Mathematics 21A, 21B, 21C, 21D,  
22A, 22B ..... 22  
Computer Science Engineering 30 (or  
equivalent programming course) ..... 4  
Chemistry 2A or 2HA (2B-2C or 2HB-2HC  
highly recommended) ..... 5

#### Depth Subject Matter .....59-65

Physics 104A, 105A, 108, 108L, 110A,  
110B, 112, 115A, 115B ..... 32  
Physics 102 or 104B ..... 1-4  
Laboratory Requirement ..... 4

Physics 122A or 122B or 157

Physics 151, 152, 153, 156 ..... 16  
Two elective courses from: Physics 105B,  
110C, 116A, 129A, 130A, 130B, 150 (only  
with an astrophysics topic and prior  
departmental approval), 154, 155, Geology  
163; may include only one course from:  
Physics 194H, 195, or 199 ..... 6-9

#### Total Units for the Major .....109-121

## Recommended

Computer Science Engineering 40;  
Astronomy 25

## Applied Physics—Atmospheric Physics Concentration

### B.S. Major Requirements:

#### UNITS Preparatory Subject Matter.....50-56

Physics 9A, 9B, 9C, 9D or 9HA, 9HB,  
9HC, 9HD, 9HE ..... 19-25  
Mathematics 21A, 21B, 21C, 21D, 22A,  
22B ..... 22  
Computer Science Engineering 30 (or  
equivalent programming course) ..... 4  
Chemistry 2A or 2HA ..... 5

#### Depth Subject Matter .....61-65

Physics 104A, 105A, 110A, 110B, 112,  
115A, 116A, 116B ..... 32  
Physics 102 (1 unit) or 104B ..... 1-4  
Laboratory Requirement ..... 4  
Physics 116C or 122A or 122B  
Concentration Courses (complete all of the  
following) ..... 20  
Physics 105C; Atmospheric Science 120,  
121A, 121B; Geology 150A  
Additional Electives (choose one from  
following) ..... 4  
Physics 104B or 116C; Geology 116N;  
Atmospheric Science 128; Mathematics  
118A or 118B

#### Total Units for the Major .....111-120

**Program Variance.** Similar courses from other departments may be substituted for courses in the depth subject matter requirements by obtaining prior written permission from the Undergraduate Curriculum Committee Chairperson.

## Applied Physics—Chemical Physics Concentration

### B.S. Major Requirements:

UNITS

#### Preparatory Subject Matter .....60-66

Physics 9A, 9B, 9C, 9D or 9HA, 9HB, 9HC,  
9HD, 9HE ..... 19-25  
Mathematics 21A, 21B, 21C, 21D, 22A,  
22B ..... 22  
Computer Science Engineering 30 (or  
equivalent programming course) ..... 4  
Chemistry 2A, 2B, 2C ..... 15

#### Depth Subject Matter .....47

Physics 102, 104A, 105A, 110A, 110B,  
112, 115A, 116A, 116B ..... 32  
Laboratory Requirement ..... 4  
Physics 122A or 122B or 116C  
Concentration Courses ..... 11  
Physics 115B, 140A; Chemistry 124A

#### Total Units for the Major .....107-113

**Program Variance.** Similar courses from other departments may be substituted for courses in the depth subject matter requirements by obtaining prior written permission from the Undergraduate Curriculum Committee Chairperson.

## Applied Physics—Computational Physics Concentration

### B.S. Major Requirements:

UNITS

#### Preparatory Subject Matter .....49-55

Physics 9A, 9B, 9C, 9D or 9HA, 9HB, 9HC,  
9HD, 9HE ..... 19-25  
Mathematics 21A, 21B, 21C, 21D, 22A,  
22B ..... 22  
Computer Science Engineering 30, 40 ..... 8

#### Depth Subject Matter .....72

Physics 104A, 105A, 110A, 110B, 112,  
115A, 116A, 116B ..... 32  
Concentration Courses ..... 16  
Physics 104B, 116C; Computer Science  
Engineering 60, 122A  
Additional Electives (choose three from the  
following) ..... 24  
Computer Science Engineering 120 or  
122B or 130; Mathematics 128A or 128B  
or 128C; Physics 105C or 115B or 140A

#### Total Units for the Major .....122-127

**Program Variance.** Similar courses from other departments may be substituted for courses in the depth subject matter requirements by obtaining prior written permission from the Undergraduate Curriculum Committee Chairperson.

## Applied Physics—Physical Electronics Concentration

### B.S. Major Requirements:

UNITS

#### Preparatory Subject Matter .....49-55

Physics 9A, 9B, 9C, 9D or 9HA, 9HB, 9HC,  
9HD, 9HE ..... 19-25  
Mathematics 21A, 21B, 21C, 21D, 22A,  
22B ..... 22  
Computer Science Engineering 30 (or  
equivalent programming course) ..... 4  
Engineering 17 ..... 4

#### Depth Subject Matter .....61

Physics 102, 104A, 105A, 110A, 110B,  
112, 115A ..... 28  
Laboratory Requirement ..... 4  
Physics 122A or 122B  
Concentration Courses ..... 13  
Physics 110C, 140A; Electrical and  
Computer Engineering 100  
Additional Concentration Electives (choose  
four from the following) ..... 16  
Electrical and Computer Engineering 110A,  
110B, 140A, 140B, 150A, or 150B

**Total Units for the Major ..... 110-116**

**Program Variance.** Similar courses from other departments may be substituted for courses in the depth subject matter requirements by obtaining prior written permission from the Undergraduate Curriculum Committee Chairperson.

**Applied Physics—Geophysics Concentration****B.S. Major Requirements:**

UNITS

**Preparatory Subject Matter ..... 50-56**

Physics 9A, 9B, 9C, 9D or 9HA, 9HB, 9HC, 9HD, 9HE .....	19-25
Mathematics 21A, 21B, 21C, 21D, 22A, 22B .....	22
Computer Science Engineering 30 (or equivalent programming course) .....	4
Chemistry 2A or 2HA .....	5

**Depth Subject Matter ..... 60-61**

Physics 104A, 105A, 110A, 110B, 112, 115A, 116A, 116B .....	32
Laboratory Requirement .....	4
Physics 122A or 122B or 116C	
Concentration Courses .....	13
Physics 104B; Geology 161, 162 (courses offered in alternating years)	
Additional Electives (choose three from the following) .....	11-12
Physics 105B or 116C or 151; Geology 146 or 163; Atmospheric Science 120 or 121A or 121B	

**Total Units for the Major ..... 110-117**

**Program Variance.** Similar courses from other departments may be substituted for courses in the depth subject matter requirements by obtaining prior written permission from the Undergraduate Curriculum Committee Chairperson.

**Applied Physics—Materials Science Concentration****B.S. Major Requirements:**

UNITS

**Preparatory Subject Matter ..... 50-56**

Physics 9A, 9B, 9C, 9D or 9HA, 9HB, 9HC, 9HD, 9HE .....	19-25
Mathematics 21A, 21B, 21C, 21D, 22A, 22B .....	22
Computer Science Engineering 30 (or equivalent programming course) .....	4
Chemistry 2A or 2HA .....	5

**Depth Subject Matter ..... 57-60**

Physics 102, 104A, 105A, 110A, 110B, 112, 115A, 116A, 116B .....	32
Physics 102 (1 unit) or 104B .....	1-4
Laboratory Requirement .....	4
Physics 122A or 122B or 116C	
Concentration Courses .....	20
Physics 115B, 140A, 140B .....	12
Material Science and Engineering 174, 180 .....	8

**Total Units for the Major ..... 107-116**

**Program Variance.** Similar courses from other departments may be substituted for courses in the depth subject matter requirements by obtaining prior written permission from the Undergraduate Curriculum Committee Chairperson.

**Applied Physics—Physical Oceanography Concentration****B.S. Major Requirements:**

UNITS

**Preparatory Subject Matter ..... 50-56**

Physics 9A, 9B, 9C, 9D or 9HA, 9HB, 9HC, 9HD, 9HE .....	19-25
Mathematics 21A, 21B, 21C, 21D, 22A, 22B .....	22
Computer Science Engineering 30 (or equivalent programming course) .....	4

Chemistry 2A or 2HA .....

**25. Introduction to Modern Astronomy and Astrophysics (4)**

Lecture—3 hours; lecture/discussion—2.5 hours.

Prerequisite: good facility in high school physics and mathematics (algebra and trigonometry). Description and interpretation of astronomical phenomena using the laws of modern physics and observations by modern astronomical instruments. Gravity, relativity, electromagnetic radiation, atomic and nuclear processes in relation to the structure and evolution of stars, galaxies and the universe. Not open to students who have received credit for course 2, 10G, or 10L. GE credit: SciEng | SE, SL, VL.—F. (F.) Fassnacht, Lubin

**Courses in Physics (PHY)**

**Physics 10** is primarily a concept-oriented one-quarter lecture/discussion course requiring relatively little mathematical background.

**Physics 1** is a two-quarter sequence requiring some mathematics (trigonometry). Either 1A alone or both quarters may be taken. The sequence is not intended to satisfy entrance requirements of a year of physics for professional schools, but will satisfy requirements of 3 or 6 units of physics.

**Physics 7** is a one-year (three-quarter) introductory physics course with laboratory intended for students majoring in the biological sciences. It has a calculus prerequisite. If you don't want a full year of introductory physics, you should take one or two quarters of Physics 1 instead. Read the following information carefully if you are using Physics 7 to complete an introductory course you have already begun.

The sequence of material in Physics 7 is different from that in most traditionally taught introductory physics courses. Physics 7B is most like the first quarter or semester of traditionally taught courses which treat classical mechanics. Physics 7C is most like the last quarter or semester which, in traditionally taught courses, treats optics, electricity and magnetism, and modern physics. The content and sequence of Physics 7A is unlike that of most other traditionally taught courses.

If you have completed one introductory quarter or semester of a traditionally taught physics course and want to continue with Physics 7, you should first take (and will receive full credit for) Physics 7A. Then, either skip 7B, but self-study the last three weeks of material, or take 7B and receive reduced credit. Finally, take 7C for full credit.

If you have taken two quarters of a year-long introductory physics course and have not had extensive work in optics, electricity and magnetism, and modern physics, you should take Physics 7C. In no case should you take Physics 7B without first taking Physics 7A. All other situations should be discussed directly with a Physics 7 instructor.

Students not intending to take the entire sequence should instead take Physics 1.

**Physics 9** is a four-quarter sequence using calculus throughout and including laboratory work as an integral component. The course is primarily for students in the physical sciences and engineering.

**Physics 9H** is a five-quarter honors physics sequence, which may be taken instead of Physics 9. It is intended primarily for first-year students with a strong interest in physics and with advanced placement in mathematics to Mathematics 21B. Students who plan to major in physics, and also motivated non-majors, should take Physics 9H instead of Physics 9 if they are ready to begin MAT21B in fall quarter. In course requirements and prerequisites, Physics 9HA-9HE can be substituted for Physics 9A-9D. Students may not switch between the 9H and 9 series beyond 9HA or 9A.

**Lower Division****1A. Principles of Physics (3)**

Lecture—3 hours. Prerequisite: trigonometry or consent of instructor. Mechanics. Introduction to general principles and analytical methods used in physics with emphasis on applications in applied agricul-

tural and biological sciences and in physical education. Not open to students who have received credit for course 7B or 9A. GE credit: SciEng | SE. —F, W. (F, W.)

### **1B. Principles of Physics (3)**

Lecture—3 hours. Prerequisite: course 1A or 9A. Continuation of course 1A. Heat, optics, electricity, modern physics. Not open for credit to students who have received credit for course 7A, 7B, 7C, 9B, 9C, or 9D. GE credit: SciEng | SE. —W. (W.)

### **7A. General Physics (4)**

Lecture—1.5 hours; discussion/laboratory—5 hours. Prerequisite: completion or concurrent enrollment in Mathematics 16B, 17B, or 21B. Introduction to general principles and analytical methods used in physics for students majoring in a biological science. Only two units of credit allowed to students who have completed course 1B or 9B. GE credit: SciEng | SE. —F, W, S. (F, W, S.)

### **7B. General Physics (4)**

Lecture—1.5 hours; discussion/laboratory—5 hours. Prerequisite: course 7A. Continuation of course 7A. Only two units of credit allowed to students who have completed course 9A, or 1A. GE credit: SciEng | SE. —F, W, S. (F, W, S.)

### **7C. General Physics (4)**

Lecture—1.5 hours; discussion/laboratory—5 hours. Prerequisite: course 7B. Continuation of course 7B. Only two units of credit allowed to students who have completed course 9C or 5C. GE credit: SciEng | SE. —F, W, S. (F, W, S.)

### **9A. Classical Physics (5)**

Lecture—3 hours; laboratory—2.5 hours; discussion—1 hour. Prerequisite: Mathematics 21B. Introduction to general principles and analytical methods used in physics for physical science and engineering majors. Classical mechanics. Only 2 units of credit to students who have completed course 1A or 7B. Not open for credit to students who have completed course 9HA. GE credit: SciEng | SE. —F, S. (F, S.)

### **9B. Classical Physics (5)**

Lecture—3 hours; laboratory—2.5 hours; discussion—1 hour. Prerequisite: course 9A, Mathematics 21C, 21D (may be taken concurrently). Continuation of course 9A. Fluid mechanics, thermodynamics, wave phenomena, optics. Only two units of credit for students who have completed course 7A; not open for credit to students who have completed course 9HB, 9HC, or Engineering 105. GE credit: SciEng | SE. —F, W. (F, W.)

### **9C. Classical Physics (5)**

Lecture—3 hours; laboratory—2.5 hours; discussion—1 hour. Prerequisite: course 9B, Mathematics 21D, 22A (may be taken concurrently). Electricity and magnetism including circuits and Maxwell's equations. Only 3 units of credit to students who have completed course 7C. Not open for credit to students who have completed course 9HD. GE credit: SciEng | SE. —F, S. (F, S.)

### **9D. Modern Physics (4)**

Lecture—3 hours; discussion—1.5 hours. Prerequisite: course 9C and Mathematics 22A; Mathematics 22B recommended (may be taken concurrently). Introduction to physics concepts developed since 1900. Special relativity, quantum mechanics, atoms, molecules, condensed matter, nuclear and particle physics. Not open for credit to students who have completed course 9HB, 9HC, or 9HE. GE credit: SciEng | SE. —F, S. (F, S.)

### **9HA. Honors Physics (5)**

Lecture—3 hours; discussion/laboratory—4 hours. Prerequisite: Mathematics 21B (may be taken concurrently) or consent of instructor. Classical mechanics. Same material as course 9A in greater depth. For students in physical sciences, mathematics, and engineering. Only 2 units of credit to students who have completed course 7B. Not open for credit to students who have completed course 9A. GE credit: SciEng | SE. —F. (F.)

### **9HB. Honors Physics (5)**

Lecture—3 hours; discussion/laboratory—4 hours. Prerequisite: Physics 9HA or 9A, Mathematics 21C (may be taken concurrently). Special relativity, thermal physics. Continuation of course 9HA. Only 2 units of credit to students who have completed course 7A. Not open for credit to students who have completed course 9B or 9D. GE credit: SciEng | SE. —W. (W.)

### **9HC. Honors Physics (5)**

Lecture—3 hours; discussion/laboratory—4 hours. Prerequisite: course 9HB and Mathematics 21D (may be taken concurrently). Waves, sound, optics, quantum physics. Continuation of Physics 9HB. Only 2 units of credit to students who have completed course 7C. Not open for credit to students who have completed course 9B or 9D. GE credit: SciEng | SE. —S. (S.)

### **9HD. Honors Physics (5)**

Lecture—3 hours; discussion/laboratory—4 hours. Prerequisite: course 9HC and Mathematics 21D. Electricity and magnetism. Continuation of Physics 9HC. Not open for credit to students who have completed course 9C. GE credit: SciEng | SE. —F. (F.)

### **9HE. Honors Physics (5)**

Lecture—3 hours; discussion/laboratory—4 hours. Prerequisite: course 9HD and Mathematics 22B (may be taken concurrently). Application of quantum mechanics. Not open for credit to students who have completed course 9D. GE credit: SciEng | SE. —W. (W.)

### **10. Topics in Physics for Nonscientists (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: high school algebra. Emphasis varies: survey of basic principles or a deeper exploration of some particular branch. Past topics included black holes, space time, and relativity; physics of music; history and philosophy; energy and the environment; and natural phenomena. Check with the Department office for the current emphasis. No units of credit allowed if taken after any other physics course. GE credit: SciEng | SE, Wrt | SE.

### **10C. Physics of California (3)**

Lecture—3 hours. Atmospheric phenomena common in CA, local weather patterns and microclimes. Applications to CA energy, water, and resource management policies. Physics underlying regional sports in CA. Not open for credit to students who have completed any quarter of Physics 9 or 9H, or any upper division physics course. GE credit: SciEng | SE, VL, SL. —F. (F.) Bradac

### **12. Visualization in Science (3)**

Lecture—3 hours. Class size limited to 20-50 students. Production, interpretation, and use of images in physics, astronomy, biology, and chemistry as scientific evidence and for communication of research results. Offered irregularly. GE credit: SciEng | SE, VL. —S. (S.) Terning

### **30. Fractals, Chaos and Complexity (3)**

Lecture/discussion—3 hours. Prerequisite: Mathematics 16A or 21A. Modern ideas about the underlying ideas of fractal geometry, chaos and complexity. Basic theory and applications with examples from physics, earth sciences, mathematics, population dynamics, ecology, history, economics, biology, computer science, art and architecture. Offered in alternate years. (Same course as Geology 30.) GE credit: SciEng | QL, SE. —W. Rundle

### **49. Supplementary Work in Lower Division Physics (1-3)**

Students with partial credit in lower division physics courses may, with consent of instructor, complete the credit under this heading. May be repeated for credit. GE credit: SciEng | SE. —F, W, S. (F, W, S.)

### **90X. Lower Division Seminar (2)**

Seminar—2 hours. Prerequisite: lower division standing; consent of instructor. Limited enrollment. Examination of a special topic in Physics through shared readings, discussions, written assignments, or special activities such as laboratory work. May be repeated for credit. GE credit: SciEng | SE.

### **98. Directed Group Study (1-5)**

Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.) GE credit: SE.

### **99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) GE credit: SE.

### **Upper Division**

#### **102. Computational Laboratory in Physics (1)**

Laboratory—4 hours. Prerequisite: Mathematics 21D, 22AB; Computer Science Engineering 30; course 9D or 9HD; course 104A concurrently. Introduction to computational physics and to the computational resources in the physics department.

Preparation for brief programming assignments required in other upper division physics classes. Not open to students who have completed course 104B or 105AL. GE credit: S SciEng | E. —F. (F.) Scalettar

#### **104A. Introductory Methods of Mathematical Physics (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: courses 9B, 9C, 9D and Mathematics 21D, 22A, and 22B with grade C- or better or consent of instructor. Introduction to the mathematics used in upper-division physics courses, including applications of vector spaces, Fourier analysis, partial differential equations. —F. (F.)

#### **104B. Computational Methods of Mathematical Physics (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 104A with grade C- or better and course 105AL or consent of instructor. Introduction to the use of computational techniques to solve the mathematical problems that arise in advanced physics courses, complementing the analytical approaches emphasized in course 104A. GE credit: SciEng | SE. —W. (W.)

#### **104C. Intermediate Methods of Mathematical Physics (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 104A with grade C- or better or consent of instructor. Applications of complex analysis, conditional probability, integral transformations and other advanced topics. Offered in alternate years. —S. (S.) Cheng, Kaloper

#### **105A. Analytical Mechanics (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: courses 9B, 9C, 9D and Mathematics 21D, 22A, and 22B passed with grade C- or better; or consent of department; course 104A and 105A passed with a grade C- or better or consent of department required for 105B. Principles and applications of Newtonian mechanics; introduction to Lagrange's and Hamilton's equations. GE credit: SciEng | SE. —F. (F.) Svoboda

#### **105B. Analytical Mechanics (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: courses 9B, 9C, 9D and Mathematics 21D, 22A, and 22B passed with grade C- or better; or consent of department; course 104A and 105A passed with a grade C- or better or consent of department required for 105B. Principles and applications of Newtonian mechanics; introduction to Lagrange's and Hamilton's equations. GE credit: SciEng | SE. —W. (W.) Conway

#### **105C. Continuum Mechanics (4)**

Lecture—3 hours. Prerequisite: 104A and 105A passed with a grade of C- or better, or consent of department. The continuum hypothesis and limitations, tensors, isotropic constitutive equations, and wave propagation. Applications such as elastic solids, heat flow, aerodynamics, and ocean waves. Offered irregularly. GE credit: SciEng | SE. —S. (S.) Zieve

#### **108. Optics (3)**

Lecture—3 hours. Prerequisite: course 9 or 7 sequence and Mathematics 21 sequence or consent of instructor. The phenomena of diffraction, interference, and polarization of light, with applications to current problems in astrophysics, material science,

and atmospheric science. Study of modern optical instrumentation. Open to non-majors. GE credit: SciEng | SE. —S. Zhu

### **108L. Optics Laboratory (1)**

Laboratory—3 hours. Prerequisite: course 108 concurrently. The laboratory will consist of one major project pursued throughout the quarter, based on modern applications of optical techniques. GE credit: SciEng | SE. —S. (S.) Zhu

### **110A. Electricity and Magnetism (4)**

Lecture—3 hours. Prerequisite: courses 9B, 9C, 9D and Mathematics 21D, 22A, and 22B with grade C- or better, or consent of department. Theory of electrostatics, electromagnetism, Maxwell's equations, electromagnetic waves. GE credit: SciEng | SE. —W. (W.) Yu

### **110B. Electricity and Magnetism (4)**

Lecture—3 hours. Prerequisite: courses 110A and 104A with a grade of C- or better or consent of department. Theory of electrostatics, electromagnetism, Maxwell's equations, electromagnetic waves. GE credit: SciEng | SE. —S. (S.) Yu

### **110C. Electricity and Magnetism (4)**

Lecture—3 hours. Prerequisite: course 110B with a grade of C- or better, or consent of department. Theory of electrostatics, electromagnetism, Maxwell's equations, electromagnetic waves. GE credit: SciEng | SE. —F. (F.) Yu

### **112. Thermodynamics and Statistical Mechanics (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 115A or the equivalent. Introduction to classical and quantum statistical mechanics and their connections with thermodynamics. The theory is developed for the ideal gas model and simple magnetic models and then extended to studies of solids, quantum fluids, and chemical equilibria. GE credit: SciEng | SE. —F. (F.)

### **115A. Foundation of Quantum Mechanics (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: courses 104A and 105A passed with a grade of C- or better, or consent of department. Introduction to the methods of quantum mechanics with applications to atomic, molecular, solid state, nuclear and elementary particle physics. Extensive problem solving. GE credit: SciEng | SE. —S. (S.) Carlip, Curro

### **115B. Applications of Quantum Mechanics (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 115A passed with a grade of C- or better, or consent of department. Angular momentum and spin; hydrogen atom and atomic spectra; perturbation theory; scattering theory. GE credit: SciEng | SE. —F. (F.) Curro, Scalettar

### **116A. Electronic Instrumentation (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 9C and Math 22B or consent of instructor. Experimental and theoretical study of important analog electronic circuits. Linear circuits, transmission lines, input impedance, feedback, amplifiers, oscillators, noise. GE credit: SciEng | SE, VL. —F. (F.) Cebra

### **116B. Electronic Instrumentation (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 9C or 9HD or consent of instructor. Continuation of course 116A. Introduction to the use of digital electronics and microcomputers in experimental physics. Nonlinear electronics, integrated circuits, analog-to-digital and digital-to-analog converters, transducers, actuators. GE credit: SciEng | SE. —W. (W.) Tripathi

### **116C. Introduction to Computer-Based Experiments in Physics (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 9D or 9HD, 116B, Mathematics 22B or consent of instructor. Introduction to techniques for making physical measurements using computer-based instrumentation. GE credit: SciEng | SE, WE. —S. (S.) Mulhearn

### **122A. Advanced Laboratory in Condensed Matter Physics (4)**

Laboratory—8 hours. Prerequisite: course 104A, 105A, 110B, 115A and 112 (may be taken concurrently) or consent of the department. Experimental techniques and measurements in solid-state physics. Student performs three to six experiments depending on difficulty. Individual work is stressed. Thorough write-ups of the experiments are required. GE credit: SciEng | SE, WE. —W. (W.) Tyson, Zhu

### **122B. Advanced Laboratory in Particle Physics (4)**

Laboratory—8 hours. Prerequisite: course 104A, 105A, 110B, 115A and 112 (may be taken concurrently) or consent of the department. Experimental techniques and measurements in nuclear and particle physics. Students perform three to six experiments depending on difficulty. Individual work is stressed. Thorough write-ups of the experiments are required. GE credit: SciEng | SE, WE. —W. (W.) Pantic, Tyson, Zhu

### **123. Signals and Noise in Physics (4)**

Lecture—3 hours; project—1 hour. Prerequisite: courses 9A, B, C, D and 104A, or consent of instructor. Techniques of measurement and analysis designed to avoid systematic error and maximize signal/noise ratio. Illustrative examples of optimal filters ranging from condensed matter to cosmology. Not open to students who have completed this course previously as course 198. Offered in alternate years. GE credit: SciEng | SE. —S. Tyson

### **129A. Introduction to Nuclear Physics (4)**

Lecture—3 hours. Prerequisite: course 115A passed with a grade of C- or better or consent of instructor. Survey of basic nuclear properties and concepts requiring introductory knowledge of quantum mechanics: nuclear models and forces, radioactive decay and detecting nuclear radiation and nuclear reaction products, alpha, beta and gamma decay. GE credit: SciEng | SE. —S. (S.) Ferenc

### **129B. Nuclear Physics, Extensions and Applications (4)**

Lecture—3 hours; term paper. Prerequisite: course 129A. Continuation of course 129A. Nuclear reactions, neutrons, fission, fusion accelerators, introduction to meson and particle physics, nuclear astrophysics, and applications of nuclear physics and techniques to mass spectrometry, nuclear medicine, trace element analysis. GE credit: SciEng | SE.

### **130A. Elementary Particle Physics (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 115A passed with a grade of C- or better or consent of instructor. Properties and classification of elementary particles and their interactions. Experimental techniques. Conservation laws and symmetries. Strong, electromagnetic, and weak interactions. Introduction to Feynman calculus. GE credit: SciEng | SE. —W. (W.) Chertok

### **130B. Elementary Particle Physics (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 115A passed with a grade of C- or better or consent of instructor. Properties and classification of elementary particles and their interactions. Experimental techniques. Conservation laws and symmetries. Strong, electromagnetic, and weak interactions. Introduction to Feynman calculus. GE credit: SciEng | SE. —S. (S.) Svboda

### **140A. Introduction to Solid State Physics (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 115A or the equivalent passed with a grade of C- or better or consent of instructor. Survey of fundamental ideas in the physics of solids, with selected device applications. Crystal structure, x-ray and neutron diffraction, phonons, simple metals, energy bands and Fermi surfaces, semiconductors, optical properties, magnetism, superconductivity. GE credit: SciEng | SE. —W. (W.) Fadley, Pickett, Zieve, Zimanyi

### **140B. Introduction to Solid State Physics (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 115A or the equivalent passed with a grade of C- or better or consent of instructor. Survey of fundamental ideas in the physics of solids, with

selected device applications. Crystal structure, x-ray and neutron diffraction, phonons, simple metals, energy bands and Fermi surfaces, semiconductors, optical properties, magnetism, superconductivity. GE credit: SciEng | SE. —S. (S.) Fadley, Pickett, Zieve, Zimanyi

### **150. Special Topics in Physics (4)**

Lecture—3 hours; project. Prerequisite: courses 9A, B, C, D or 9HA, HB, HC, HD, HE or consent of instructor. Topics vary, covering areas of contemporary research in physics. May be repeated for credit. GE credit: SciEng | SE. —F, W, S. (F, W, S.)

### **151. Stellar Structure and Evolution (4)**

Lecture—3 hours; project. Prerequisite: courses 9A, B, C, D or consent of instructor. The chemical composition, structure, energy sources and evolutionary history of stars, with equal emphasis on both the observational data and theoretical models, including black holes, neutron stars and white dwarfs and the formation of substellar masses. Offered in alternate years. GE credit: SciEng | SE. —(F) Becker, Boeshaar

### **152. Galactic Structure and the Interstellar Medium (4)**

Lecture—3 hours; project. Prerequisite: courses 9A, B, C, D and 105A concurrently or consent of instructor. The structure, contents, and formation of our Milky Way galaxy, viz. its shape and size, the nature of the interstellar medium, stellar populations, rotation curves, mass determination and evidence of dark matter. Offered in alternate years. GE credit: SciEng | SE. —F Boeshaar, Knox

### **153. Extragalactic Astrophysics (4)**

Lecture—3 hours; project. Prerequisite: courses 9A, B, C, D, 104A and 105A or consent of instructor. Structure and evolution of galaxies and clusters of galaxies, including distance and mass determination, galaxy types and environments, active galactic nuclei and quasars, gravitational lensing and dark matter, global cosmological properties. Not open to students who have completed course 127. Offered in alternate years. GE credit: SciEng | SE. —(W.) Fassnacht, Wittman

### **154. Astrophysical Applications of Physics (4)**

Lecture—3 hours; project. Prerequisite: course 105AB, 110A; 110B and 115A concurrently; 112 or consent of instructor. Applications of classical and quantum mechanics, thermodynamics, statistical mechanics, and electricity and magnetism to astrophysical settings such as the Big Bang, degenerate white dwarf and neutron stars, and solar neutrinos. Not open to students who have completed this course previously as course 198. Offered in alternate years. GE credit: SciEng | SE. —(S.) Bradac, Knox

### **155. General Relativity (4)**

Lecture—3 hours; project. Prerequisite: course 104A and 105A; 105B and 110A or consent of instructor. Definition of the mathematical frame work for the description of the gravitational field, introduction of the dynamical equations of Einstein governing its evolution and review of the key solutions, including black holes and expanding universes. Offered in alternate years. GE credit: SciEng | SE. —W. (W.) Kaloper, Wittman

### **156. Introduction to Cosmology (4)**

Lecture—3 hours; project. Prerequisite: courses 9A, B, C, D and 105A concurrently or consent of instructor. Contemporary knowledge regarding the origin of the universe, including the Big Bang and nucleosynthesis, microwave background radiation, formation of cosmic structure, cosmic inflation, cosmic acceleration and dark energy. Offered in alternate years. Not open to students who have completed course 126. GE credit: SciEng | SE. —W. Knox

### **157. Astronomy Instrumentation and Data Analysis Laboratory (4)**

Laboratory—8 hours. Prerequisite: course 104A, 105A, 110A; 115A and 110B may be taken concurrently; consent of instructor. Open to Astrophysics Specialization majors. Experimental techniques, data acquisition and analysis involving laboratory astrophysics plus stellar, nebular and galaxy digital

imaging, photometry and/or spectroscopy. Students perform three experiments. Individual work stressed. Minimum 10-15 page journal style articles of two experiments are required. Offered in alternate years. GE credit: SciEng | SE, WE.—S. (S.) Boeshaar, Tyson

### **160. Environmental Physics and Society (3)**

Lecture—3 hours. Prerequisite: course 9D or 7C; or course 10 or 1B and Mathematics 16B or the equivalent. Impact of humankind on the environment will be discussed from the point of view of the physical sciences. Calculations based on physical principles will be made, and the resulting policy implications will be considered. (Same course as Engineering 160.) GE credit: SciEng or SocSci | SE, SL.—S. (S.) Cox

### **185. Alumni Seminar Series (1)**

Seminar—1 hour. Weekly guest speakers (usually a physics alumnus or alumna) tell students about their careers. Speakers use their experience to give students valuable perspectives on life after a degree in physics. May be repeated two times for credit. (P/NP grading only.) GE credit: SciEng | SE.—S. (S.) Knox

### **190. Careers in Physics (1)**

Seminar—2 hours. Restricted to Physics and Applied Physics majors only. Overview of important research areas in physics, discussions of research opportunities and internships, strategies for graduate school and industrial careers, the fellowship and assistantship selection process, preparation of resumes, personal statements, and letters of recommendation. (P/NP grading only.) GE credit: SE.—F. (F.) F.

### **194HA. Special Study for Honors Students (4)**

Independent study—12 hours. Prerequisite: consent of instructor required. Open only to Physics and Applied Physics majors who satisfy the College of Letters and Science requirements for entrance into the Honors Program. Independent research project at a level significantly beyond that defined by the normal physics curriculum. (Deferred grading only, pending completion of sequence). GE credit: SciEng | SE, F, W, S. (F, W, S.)

### **194HB. Special Study for Honors Students (4)**

Independent study—12 hours. Prerequisite: consent of instructor required. Open only to Physics and Applied Physics majors who satisfy the College of Letters and Science requirements for entrance into the Honors Program. Independent research project at a level significantly beyond that defined by the normal physics curriculum. (Deferred grading only, pending completion of sequence). GE credit: SciEng | SE, F, W, S. (F, W, S.)

### **195. Senior Thesis (5)**

Independent study—15 hours. Prerequisite: consent of instructor required. Open only to Physics and Applied Physics majors with senior standing. Preparation of a senior thesis on a topic selected by the student with approval of the department. May be repeated for a total of 15 units. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

### **197T. Tutoring in Physics and Astronomy (1-5)**

Tutoring of students in lower division courses. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. Weekly meeting with instructor. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

### **199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.) GE credit: SE.—F, W, S. (F, W, S.)

## **Graduate**

### **200A. Theory of Mechanics and Electromagnetics (4)**

Lecture—3 hours; independent study—1 hour. Prerequisite: courses 104B, 105B, and 110C or the equivalent; course 204A concurrently. Theoretical approaches in classical mechanics including the use of generalized coordinates and virtual work; variational calculus; Lagrange equations; symmetries, conservation laws, and Noether theorem; Lagrangian density; Hamilton formalism; canonical transformations; Poisson brackets; and Hamilton-Jacobi equations.—F. (F.) Knox

### **200B. Theory of Mechanics and Electromagnetics (4)**

Lecture—3 hours; independent study—1 hour. Prerequisite: course 200A, and course 204B concurrently. Theoretical approaches in electromagnetics including static electromagnetic fields; Maxwell's equations; plane waves in various media; magnetohydrodynamics; diffraction theory; radiating systems; and special relativity.—W. (W.) Chiang

### **200C. Theory of Mechanics and Electromagnetics (4)**

Lecture—3 hours; independent study—1 hour. Prerequisite: course 200A, and course 204B concurrently. Theoretical approaches in electromagnetics including static electromagnetic fields; Maxwell's equations; plane waves in various media; magnetohydrodynamics; diffraction theory; radiating systems; and special relativity.—S. (S.) Knox, Scalettar

### **204A. Methods of Mathematical Physics (4)**

Lecture—3 hours; independent study—1 hour. Prerequisite: course 104A or the equivalent. Linear vector spaces, operators and their spectral analysis, complete sets of functions, complex variables, functional analysis, Green's functions, calculus of variations, introduction to numerical analysis.—F. (F.) Kaloper, Zieve

### **204B. Methods of Mathematical Physics (4)**

Lecture—3 hours; independent study—1 hour. Prerequisite: courses 104A and 104B or the equivalent. Linear vector spaces, operators and their spectral analysis, complete sets of functions, complex variables, functional analysis, Green's functions, calculus of variations, introduction to numerical analysis.—W. (W.) Kaloper, Zieve

### **210. Computational Physics (3)**

Lecture—3 hours. Prerequisite: knowledge of Fortran or C. Analytic techniques to solve differential equations and eigenvalue problems. Physics content of course will be self-contained, and adjusted according to background of students. Offered irregularly.

### **215A. Quantum Mechanics (4)**

Lecture—3 hours; independent study—1 hour. Prerequisite: course 115B or the equivalent. Formal development and interpretation of non-relativistic quantum mechanics; its application to atomic, nuclear, molecular, and solid-state problems; brief introduction to relativistic quantum mechanics and the Dirac equation.—F. (F.) Cheng

### **215B. Quantum Mechanics (4)**

Lecture—3 hours; independent study—1 hour. Prerequisite: course 115B or the equivalent. Formal development and interpretation of non-relativistic quantum mechanics; its application to atomic, nuclear, molecular, and solid-state problems; brief introduction to relativistic quantum mechanics and the Dirac equation.—W. (W.) Cheng

### **215C. Quantum Mechanics (4)**

Lecture—3 hours; independent study—1 hour. Prerequisite: course 115B or the equivalent. Formal development and interpretation of non-relativistic quantum mechanics; its application to atomic, nuclear, molecular, and solid-state problems; brief introduction to relativistic quantum mechanics and the Dirac equation.—S. (S.) Fong

### **219A. Statistical Mechanics (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 215B or the equivalent. Foundations of thermodynamics and classical and quantum statisti-

cal mechanics with simple applications to properties of solids, real gases, nuclear matter, etc. and a brief introduction to phase transitions.—S. (S.) Savrasov

### **219B. Statistical Mechanics (4)**

Lecture—3 hours; extensive problem solving. Prerequisite: course 219A. Further applications of thermodynamics and classical and quantum statistical mechanics. The modern theory of fluctuations about the equilibrium state, phase transitions and critical phenomena.—F. (F.) Singh

### **223A. Group Theoretical Methods of Physics—Condensed Matter (3)**

Lecture—3 hours. Prerequisite: courses 215A, 215B (215C is corequisite) or consent of instructor. Theory of groups and their representations with applications in condensed matter. Offered irregularly.

### **223B. Group Theoretical Methods of Physics—Elementary Particles (3)**

Lecture—3 hours. Prerequisite: courses 215A, 215B (215C is corequisite) or consent of instructor. Theory of groups and their representations with applications in elementary particle physics. Offered irregularly.

### **224A. Nuclear Physics (3)**

Lecture—3 hours. Prerequisite: course 215B. Comprehensive study of the nucleon-nucleon interaction including the deuteron, nucleon-nucleon scattering, polarization, determination of real parameters of S-matrix, and related topics. Offered irregularly.

### **224B. Nuclear Physics (3)**

Lecture—3 hours. Prerequisite: course 224A. Study of nuclear models, including shell model, collective model, unified model. Energy level spectra, static momenta, and electromagnetic transition rates. Offered irregularly.

### **224C. Nuclear Physics (3)**

Lecture—3 hours. Prerequisite: course 224B. Study of nuclear scattering and reactions including the optical model and direct interactions. Beta decay and an introduction to weak interactions. Offered irregularly.

### **229A. Advanced Nuclear Theory (3)**

Lecture—3 hours. Prerequisite: course 224C. Advanced topics in nuclear theory; theory of quantum-mechanical scattering processes. Exact formal theory and models for two-body scattering. Offered irregularly.

### **229B. Advanced Nuclear Theory (3)**

Lecture—3 hours. Prerequisite: course 229A. Advanced topics in nuclear theory; theory of quantum-mechanical scattering processes. Exact formal theory and models for three-body scattering. Offered irregularly.

### **230A. Quantum Theory of Fields (3)**

Lecture—3 hours. Prerequisite: course 215C. Relativistic quantum mechanics of particles; techniques and applications of second quantization; Feynman diagrams; renormalization.—S. (S.) Luty

### **230B. Quantum Theory of Fields (3)**

Lecture—3 hours. Prerequisite: course 230A. Continuation of 230A, with selected advanced topics, such as S-matrix theory, dispersion relations, axiomatic formulations.—F. (F.) Luty

### **230C. Quantum Theory of Fields (3)**

Lecture—3 hours. Prerequisite: course 230A and B, or consent of instructor. Renormalization theory and applications, including dimensional regularization, Ward identities, renormalization group equations, coupling constant unification, and precision electroweak calculations. May be repeated for credit with consent of instructor.—W. (W.) Gunion

### **240A. Condensed Matter Physics A (3)**

Lecture—3 hours. Prerequisite: course 215C, 219A; course 140AB or equivalent recommended. Topics in condensed matter physics: Crystal structure; one-electron theory; transport and optical properties of semiconductors; phonons, electron-phonon scattering.—F. (F.) Pickett

**240B. Condensed Matter Physics B (3)**

Lecture—3 hours. Prerequisite: course 240A. Topics in condensed matter physics: transport and optical properties of metals and quantum structures; experimental measurement the Fermi surface and of phonon spectra.—W. (W.) Pickett

**240C. Condensed Matter Physics (3)**

Lecture—3 hours. Prerequisite: course 240AB. Review of second quantization. Interacting electron gas, electron-phonon interaction and effects, including instabilities of electronic systems. Topics in the theory of superconductivity and magnetism.—S. (S.) Zimanyi

**241. Advanced Topics in Magnetism (3)**

Lecture—3 hours. Prerequisite: courses 240A-240B and 240C-240D, or consent of instructor. Topics chosen from areas of current research interest. Offered irregularly.

**242. Advanced Topics in Superconductivity (3)**

Lecture—3 hours. Prerequisite: courses 240A-240B and 240C-240D, or consent of instructor. Topics chosen from areas of current research interest. Offered irregularly.

**243A. Surface Physics of Materials (3)**

Lecture—3 hours. Prerequisite: courses 140A-140B, 115A-115B or the equivalents; courses 215A, 240A, or the equivalents recommended. Experimental and theoretical fundamentals of surface and interface physics and chemistry, including electronic and magnetic structure, thermodynamics, adsorption kinetics, epitaxial growth, and a discussion of various spectroscopic and structural probes based on photons, electrons, ions, and scanning probes. Offered irregularly.

**243B. Surface Physics of Materials (3)**

Lecture—3 hours. Prerequisite: courses 140A-140B, 115A-115B or the equivalents; courses 215A, 240A, or the equivalents recommended. Experimental and theoretical fundamentals of surface and interface physics and chemistry, including electronic and magnetic structure, thermodynamics, adsorption kinetics, epitaxial growth, and a discussion of various spectroscopic and structural probes based on photons, electrons, ions, and scanning probes. Offered irregularly.

**243C. Surface Physics of Materials (3)**

Lecture—3 hours. Prerequisite: courses 140A-140B, 115A-115B or the equivalents; courses 215A, 240A, or the equivalents recommended. Experimental and theoretical fundamentals of surface and interface physics and chemistry, including electronic and magnetic structure, thermodynamics, adsorption kinetics, epitaxial growth, and a discussion of various spectroscopic and structural probes based on photons, electrons, ions, and scanning probes. Offered irregularly.

**245A. High-Energy Physics (3)**

Lecture—3 hours. Prerequisite: course 230A. Phenomenology and systematics of strong, electromagnetic, and weak interactions of hadrons and leptons; determination of quantum numbers; quarks and quarkonia; deep inelastic scattering; the quark parton model; experiments at hadron colliders and electron-positron colliders.—F. (F.) Chertok

**245B. High-Energy Physics (3)**

Lecture—3 hours. Prerequisite: course 245A. Electroweak interactions; phenomenology of the Standard Model of SU(2) $\times$ U(1); weak interaction experiments; properties of and experiments with W and Z vector bosons; Glashow-Weinberg-Salam model and the Higgs boson; introduction to supersymmetry and other speculations.—W. (W.) Cheng

**245C. Collider Physics (3)**

Lecture—3 hours. Prerequisite: course 245A; course 252B taken previously or concurrently; or consent of instructor. Collider physics. Topics include quark and gluon distribution functions and the computation of cross sections; Large Hadron Collider and International Linear Collider phenomenology; collider and detector characteristics; extracting models from

data; software tools for analyzing experimental data. May be repeated for credit with consent of instructor.—S. (S.) Mulhearn

**246A. Supersymmetry: Theory and Phenomenology (3)**

Lecture—3 hours. Prerequisite: courses 230A-230B, 245A-245B recommended, or consent of instructor. Construction of supersymmetric models of particle physics; superfields; supersymmetry breaking the minimal supersymmetric standard model; supergravity. Collider phenomenology of supersymmetry. Dark matter phenomenology. Offered irregularly.—S. (S.) Terning

**246B. Advanced Supersymmetry (3)**

Lecture—3 hours. Prerequisite: course 246A. Advanced topics in supersymmetry. Topics include holomorphy, the Affleck-Dine-Seiberg superpotential, Seiberg duality for SUSY QCD, dynamical SUSY breaking, Seiberg-Witten theory, superconformal field theories, supergravity, anomaly and gaugino mediation, and the AdS/CFT correspondence. Not offered every year.—S. (S.) Terning

**250. Special Topics in Physics (3)**

Lecture—3 hours. Prerequisite: consent of instructor. Topic varies. May be repeated for credit. Not offered every quarter.—F, W, S. (F, W, S.)

**252A. Techniques of Experimental Physics (3)**

Lecture—3 hours. Introduction to techniques and methods of designing and executing experiments. Problems and examples from condensed matter research will be utilized. Offered irregularly.

**252B. Techniques of Experimental Physics (3)**

Lecture—3 hours. Introduction to techniques and methods of designing and executing experiments. Problems and examples from nuclear and particle research will be utilized.—F. (F.) Erbacher

**252C. Statistics and Data Analysis for Particle Physics (3)**

Lecture—3 hours. Introduction to statistical data analysis methods in particle physics. Theoretical lectures combined with practical computer laboratory work.—W. (W.) Calderon, Conway

**253. Signals and Noise in Physics (3)**

Lecture—3 hours. Techniques for extracting signals from noise, systematic error. Offered irregularly.—W. (W.)

**256. Natural Computation and Self-Organization: The Physics of Information Processing in Complex Systems (3)**

Lecture—3 hours. Prerequisite: course 200A or Mathematics 119A/B or Mathematics 219, course 204A or Mathematics 119A/B or Mathematics 219; course 219A or Mathematics 135A/B or Mathematics 235A. Explores intrinsic unpredictability (deterministic chaos) and the emergence of structure in natural complex systems. Using statistical mechanics, information theory, and computation theory, the course develops a systematic framework for analyzing dynamical and stochastic processes in terms of their causal architecture.—W. (W.) Crutchfield

**260. Introduction to General Relativity (3)**

Lecture—3 hours. Prerequisite: courses 200A, 200B. An introduction to general relativity. Differential geometry and curved spacetime; the Einstein field equations; gravitational fields of stars and black holes; weak fields and gravitational radiation; experimental tests; Big Bang cosmology.—F. (F.)

**262. Early Universe Cosmology (3)**

Lecture—3 hours. Prerequisite: second year standing in Physics graduate program or consent of instructor. Introduction to early universe cosmology: the Big Bang, inflation, primordial nucleosynthesis, dark matter, dark energy, and other topics of current interest.—W. (W.)

**263. Cosmic Structure Formation (3)**

Lecture—3 hours. Prerequisite: course 260. Growth of structure from small density inhomogeneities in the early universe to the diverse structures observable

today. Use of observable properties (cosmic microwave background, gravitational lensing, peculiar velocities, number density, etc.) to constrain models of structure formation and fundamental physics.—S. (S.)

**265. High Energy Astrophysics and Radiative Processes (3)**

Lecture—3 hours. Prerequisite: graduate standing in physics or consent of instructor. Survey course covering galactic and extragalactic X-ray and gamma-ray astronomy, radiative processes, and techniques of high-energy astrophysics. Offered irregularly.

**266. Data Analysis for Astrophysics (3)**

Lecture—3 hours. Prerequisite: graduate standing in physics or consent of instructor. Survey course covering measurement and signal analysis techniques for astrophysics and cosmology throughout the electromagnetic spectrum.—F. (F.)

**267. Observational Extragalactic Astronomy & Cosmology (3)**

Lecture—3 hours. Prerequisite: graduate standing in physics or consent of the instructor. Survey course covering current areas of research on extragalactic objects, their physical properties, origin, evolution, and distribution in space.—W. (W.)

**270. Current Topics in Physics Research (3)**

Lecture/discussion—3 hours. Prerequisite: graduate standing in Physics or consent of instructor. Reading and discussion to help physics graduate students develop and maintain familiarity with the current and past literature in their immediate field of research and related areas. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**280. Seminar in Ethics for Scientists (2)**

Seminar—2 hours. Restricted to 20 students; graduate standing in any department of science or engineering. Studies of topical and historical issues in the ethics of science, possibly including issues such as proper authorship, peer review, fraud, plagiarism, responsible collaboration, and conflict of interest. (Same course as Chemistry 280 and Chemical Engineering and Materials Science 280.) (S/U grading only.)—S. (S.)

**285. Careers in Physics (1)**

Seminar—1.5 hours. Prerequisite: graduate standing in Physics. Designed to give Physics graduate students an in-depth appreciation of career opportunities with a graduate degree in physics. Professional physicists, mainly from outside academia, will give seminars describing both research and career insights. May be repeated for credit. Offered irregularly. (S/U grading only.)—S. (S.) Knox

**290. Seminar in Physics (1)**

Seminar—1 hour. Prerequisite: graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in physics. Topics will vary weekly and will cover a broad spectrum of the active fields of physics research at a level accessible to all physics graduate students. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**291. Seminar in Nuclear Physics (1)**

Seminar—1 hour. Prerequisite: graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in nuclear physics. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**292A. Seminar in Elementary Particle Physics (1)**

Seminar—1 hour. Prerequisite: graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in elementary particle physics. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**292B. High Energy Frontier Initiative And Cosmology Theory Seminar (1)**

Seminar—1 hour. Prerequisite: Physics graduate students. May be repeated five times for credit. (S/U grading only.)—F, W, S. (F, W, S.)

### **293. Seminar in Condensed Matter Physics (1)**

Seminar—1 hour. Prerequisite: graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in condensed matter physics. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

### **294. Seminar in Cosmology (1)**

Seminar—1 hour. Prerequisite: graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in Cosmology. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

### **295. Introduction to Departmental Research (1)**

Seminar—1 hour. Seminar to introduce first- and second-year physics graduate students to the fields of specialty and research of the Physics staff. (S/U grading only.)—W. (W.)

### **297. Research on the Teaching and Learning of Physics (3)**

Seminar—3 hours. Prerequisite: graduate standing in Physics or consent of instructor. Discussion and analysis of recent research in how students construct understanding of physics and other science concepts and the implications of this research for instruction. Offered irregularly.

### **298. Group Study (1-5)**

Prerequisite: consent of instructor. (S/U grading only.)

### **299. Research (1-12)**

(S/U grading only.)

## **Professional**

### **371. Teaching in an Active-Engagement Physics Discussion/Lab Setting (1)**

Lecture/discussion—1 hour. Prerequisite: course 9D or equivalent; consent of instructor. Open to graduate students only. Analysis of recent research on science/physics teaching and learning and its implications for teaching labs, discussions, and discussion/labs with an emphasis on differences between conventional and active-engagement instructional settings. The appropriate role of the instructor in specific instructional settings. May be repeated two times for credit. F, W, S. (F, W, S.)

### **390. Methods of Teaching Physics (1)**

Lecture/discussion—1 hour. Prerequisite: graduate standing in Physics; consent of instructor. Practical experience in methods and problems related to teaching physics laboratories at the university level, including discussion of teaching techniques, analysis of quizzes and laboratory reports and related topics. Required of all Physics Teaching Assistants. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

### **396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## **Physiology**

See **Anatomy, Physiology and Cell Biology (APC), on page 581; Human Physiology (HPH), on page 437; Molecular, Cellular, and Integrative Physiology (A Graduate Group), on page 466; and Neurobiology, Physiology, and Behavior, on page 478.**

## **Plant Biology**

See **Environmental Horticulture, on page 323; Plant Biology, on page 509; and Plant Biology (A Graduate Group), on page 511.**

## **Plant Biology**

(College of Biological Sciences)

William J. Lucas, Ph.D., Chairperson of the Department

Anne B. Britt, Ph.D., Vice Chairperson of the Department

**Graduate Program.** See **Plant Biology (A Graduate Group), on page 511.**

**Department Office.** 1002 Life Sciences  
530-752-0617; <http://www.plb.ucdavis.edu>

**Advising.** 1023 Sciences Laboratory Building;  
530-752-0410; <http://basc.ucdavis.edu/>

### **Committee in Charge of the Major**

Bo Liu, Ph.D.

Anne Britt, Ph.D.

Steven Theg, Ph.D

## **Faculty**

Faculty includes members of the Departments of Plant Biology, Molecular and Cellular Biology, and Evolution and Ecology in the College of Biological Sciences.

### **Primary Department Members**

Siobhan Brady, Associate Professor

Anne Britt, Ph.D., Professor

Luca Comai, Ph.D., Professor

S. P. Dinesh-Kumar, Professor

John J. Harada, Ph.D., Professor

*Academic Senate Distinguished Teaching Award*

Stacey Harmer, Ph.D., Professor

Bo Liu, Ph.D., Professor

William J. Lucas, Ph.D., Professor

Julin Malof, Ph.D., Professor

Sharman O'Neill, Ph.D., Professor

Neelima Sinha, Ph.D., Professor

Venkatesan Sundaresan, Ph.D., Professor

Steven M. Theg, Ph.D., Professor

### **Secondary Department Members**

Judy Callis, Ph.D., Professor

*Academic Senate Distinguished Teaching Award*

James A. Doyle, Ph.D., Professor

Marilynn E. Etzler, Ph.D., Professor

Charles S. Gasser, Ph.D., Professor

J. Clark Lagarias, Ph.D., Professor

Marcel Rejmanek, Ph.D., Professor

Raymond L. Rodriguez, Ph.D., Professor

Irwin Segel, Ph.D., Professor

## **Emeriti Faculty**

Michael Barbour, Ph.D., Professor Emeritus

David E. Bayer, Ph.D., Professor Emeritus

Deborah Canington, Ph.D., Lecturer

*Academic Federation Excellence in Teaching Award*

Paul A. Castelfranco, Ph.D., Professor Emeritus

Deborah P. Delmer, Ph.D., Professor Emerita

Emanuel Epstein, Ph.D., Professor Emeritus

Richard H. Falk, Ph.D., Professor Emeritus

Donald W. Kyhos, Ph.D., Professor Emeritus

Terence M. Murphy, Ph.D., Professor Emeritus

Thomas L. Rost, Ph.D., Professor Emeritus

*Academic Senate Distinguished Teaching Award*

Alan J. Stemler, Ph.D., Professor Emeritus

Kenneth Wells, Ph.D., Professor Emeritus

## **Affiliated Faculty**

John L. Bowman, Ph.D., Professor

Andrew Groover, Ph.D., Adjunct Associate Professor

Joel Ledford, Ph.D., Academic Coordinator

## **The Major Program**

As organisms that sequester carbon and convert solar energy to usable forms, plants are the primary source of food on the planet as well as important buffers against climate change. The Plant Biology major focuses on fundamental aspects of how plants function as organisms and interact with their environment. A wide variety of scientific disciplines are integrated within the Plant Biology major, including physiology, cell and molecular biology, development, genetics and genomics.

**The Program.** The plant biology major consists of a Biosciences core covering the general principles of biology plus four plant-specific classes dealing with advanced aspects of plant biology including physiology, development, and anatomy. Two required electives allow students to tailor the degree to suit their interests. Independent research in a laboratory setting is a requirement, and majors in Plant Biology are guaranteed this opportunity. Because of the value of plants as a model system for research in molecular genetics, cell biology, and biochemistry, Plant Biology makes an excellent minor or second major for student in these fields.

**Career Alternatives.** A degree in Plant Biology serves as an excellent launching point for a wide range of career options, including domestic and international opportunities in business, research and teaching in both governmental and private sectors. The program is excellent preparation for students wishing to enter graduate or other professional schools, including medicine, law (particularly environmental or patent law) or journalism. Plant biologists can work in the laboratory, in the field, in the forest, in botanical gardens or nurseries, in agricultural companies, or in biotechnology, pharmaceutical, energy or chemical industries, or in the area of environmental protection.

### **A.B. Major Requirements:**

UNITS

#### **Preparatory Subject Matter .....** 34

Biological Sciences 2A-2B-2C.....	14
Chemistry 2A-2B, 8A-8B .....	16
Statistics 13 or 100 or 102 (or Plant Sciences 120) .....	4

#### **Depth Subject Matter..... 41-42**

Biological Sciences 101 .....	4
Plant Biology 102 or 108 .....	5
Evolution and Ecology 140 or Plant Biology 116 .....	4.5
Plant Biology 105, 111, 112, 117 .....	15
Additional upper division units in Plant Biology or related natural science courses .....	13

#### **Total Units for the Major..... 75-76**

### **Recommended**

Chemistry 2C, Evolution and Ecology 100, and Plant Biology 148.

For students with interests in specialized areas of plant biology (e.g. agricultural botany, ecology, systematics and evolution, morphology, plant physiology, etc.), certain substitutions, including courses in other departments, may be allowed upon prior consultation with a Plant Biology major adviser.

### **B.S. Major Requirements:**

UNITS

#### **Preparatory Subject Matter ..... 55-65**

Biological Sciences 2A-2B-2C.....	14
Chemistry 2A-2B-2C.....	15
Chemistry 8A-8B or 118A-118B-118C .....	6-12
Mathematics 17A-17B-17C or 21A-21B (21C recommended).....	8-12
Physics 7A-7B-7C.....	12

### **Recommended**

Biological Sciences 20Q

#### **Depth Subject Matter..... 43-46**

Biological Sciences 101, 105 (or 102+103), 104 or equivalent .....	10-13
--	-------

Statistics 100 or 102 .....	4
Plant Biology 105, 111, 112.....	11
Research internship: Plant Biology 92, 99, 189, 192, 199 or equivalent.....	3
Restricted electives.....	15
Upper division courses in plant biology or other fields relevant to the student's interest chosen from the lists below. The student's academic adviser may approve additional courses as "restricted electives" at their discretion.	

**Total Units for the Major ..... 98-111**

### Course Lists

#### Ecology

Environmental Science and Policy 121, 123, 124, 150C, 151, 151L, 155, 155L; Evolution and Ecology 101, 131, 138; Hydrologic Science 124; Plant Biology 117, 119; Plant Pathology 150; Plant Sciences 112, 130, 131, 134, 135, 142, 144.

#### Evolution and Diversity

Evolution and Ecology 100, 102, 108, 140, 149; Plant Biology 102, 108, 116, 143, 148.

#### Plant Genetics

Evolution and Ecology 100, 102; Molecular and Cellular Biology 161, 164; Plant Biology 113; Plant Pathology 123; Plant Sciences 152.

#### Plant Physiology, Development, and Molecular Biology

Biotechnology 160, 161A, 161B; Molecular and Cellular Biology 126; Plant Biology 113, 126; Plant Pathology 123, 130; Plant Sciences 153, 157, 158.

**Master Adviser.** Siobhan Brady, Plant Biology Department office in 2251 Life Sciences

### Minor Program Requirements:

#### UNITS

#### Minor Requirements ..... 18

Upper division units, including at least one course from each of the following four groups ..... 18  
 (a) Anatomy and Morphology:  
     Evolution and Ecology 140; Plant Biology 105, 116  
 (b) Physiology and Development:  
     Plant Biology 111, 112, 123; Plant Pathology 130  
 (c) Evolution and Ecology:  
     Evolution and Ecology 100; Plant Biology 102, 108, 117, 143  
 (d) Biochemistry and Molecular Genetics:  
     Biotechnology 160; Plant Biology 113, 126; Plant Sciences 152, 154, 171, 172

**Minor Adviser.** Same as for major above.

**Honors and Honors Programs.** Students on the honors list may elect to include a maximum of 5 units of 194H in their major programs. Refer to the Academic Information chapter and the appropriate College section for Dean's Honors List information.

**Graduate Study.** Consult the Plant Biology Graduate Group listing.

### Courses in Plant Biology (PLB)

#### Lower Division

##### 10. Plant Biology (3)

Lecture—3 hours. The social and natural science of plants. Cultural history and socioeconomic importance of plants. Biology of plants reproduction, including flowers, seeds and fruits. Historical, cultural, religious and medicinal uses of plants. Plants in the visual arts, music and literature. GE credit: SciEng | SE, SL.—W, S. (W, S.) O'Neill

##### 90X. Plant Science Seminar (1-4)

Prerequisite: consent of instructor. Examination of a special topic in a small group setting. Not open for credit to students who have completed course Plant Sciences 90X. (Former course Plant Sciences 90X.)

##### 92. Internship (1-12)

Internship—3-36 hours. Prerequisite: consent of instructor. Technical and/or professional experience on or off campus. Supervised by a member of the Plant Biology faculty. (P/NP grading only.)

##### 98. Directed Group Study (1-5)

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

##### 99. Special Study for Undergraduates (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division

For questions about courses numbered 102 through 126, see the Plant Biology Department office in 1002 Life Sciences. For questions concerning courses numbered 1, 12, 140 through 188 and 196, see the Plant Science Advising Center in 1220 Plant and Environmental Sciences.

##### 102. California Floristics (5)

Lecture—3 hours; laboratory—8 hours. Prerequisite: Plant Sciences 2, Biological Sciences 1C, 2C, or equivalent course in Plant Science. Survey of the flora of California, emphasizing recognition of important vascular plant families and genera and use of taxonomic keys for species identification. Current understanding of relationships among families. Principles of plant taxonomy and phylogenetic systematics. One Saturday field trip. (Same course as Plant Sciences 102.) GE credit: SciEng | SE, VL.—S. (S.) Potter

##### 105. Developmental Plant Anatomy (5)

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 2C or other similar preparation in plant biology. Restricted to 50 students; split equally into two lab groups. Structural anatomy of vascular plants. Training in basic tissue sectioning, staining, and use of the compound microscope. GE credit: SciEng | SE.—F. (F.) O'Neill

##### 108. Systematics and Evolution of Angiosperms (5)

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or 2A, 2B, 2C. Diversity and classification of angiosperms (flowering plants) on a world scale, and current understanding of the origin of angiosperms and evolutionary relationships and trends within them based on morphological and molecular evidence. (Same course as Evolution and Ecology 108.) GE credit: SciEng.—S. (S.) Doyle

##### 111. Plant Physiology (3)

Lecture—3 hours. Prerequisite: Biological Sciences 2A, 2B, and 2C; Chemistry 118B or 8B and Physics 7C (either may be taken concurrently); Plant Biology 105 recommended. The plant cell as a functional unit. The processes of absorption, movement, and utilization of water and minerals. Water loss, translocation, photosynthesis, respiration.—F. (F.) Dehesh, Lucas

##### 111D. Problems in Plant Physiology (1)

Discussion—1 hour. Prerequisite: course 111 concurrently. Discussion of problems and applications relating to principles presented in course 111. Students will be assigned problems each week showing novel applications of principles described in course 111 and will prepare answers to be delivered orally during the class period. (P/NP grading only.)—F. (F.) Lucas, Dehesh

##### 112. Plant Growth and Development (3)

Lecture—3 hours. Prerequisite: Sciences 2A, 2B, and 2C; Chemistry 118B or 8B; Biological Sciences 101. Introduction to the mechanisms and control systems that govern plant growth and development and the responses of plants to the environment. Strong emphasis on vegetative development of flowering plants. GE credit: SciEng | QL, SE, SL.—W. (W.) Harada, Sundaresan

##### 112D. Problems in Plant Growth and Development (1)

Discussion—1 hour. Prerequisite: course 112 concurrently. Discussion of problems and applications relating to principles presented in course 112. Students

will be assigned problems each week showing novel applications of the principles described in course 112 and will prepare answers to be delivered orally during class period. (P/NP grading only.)—W. (W.) Harada, Sundaresan

##### 113. Molecular and Cellular Biology of Plants (3)

Lecture—3 hours. Prerequisite: Biological Sciences 2A, 2B, 2C; Biological Sciences 101. Molecular and cellular aspects of the growth and development of plants and their response to biological and environmental stresses. Primary focus on processes unique to plants. Experimental approaches will be emphasized. GE credit: QL, SL, VL.—S. (S.) Harada

##### 113D. Problems in Molecular and Cellular Biology of Plants (1)

Discussion—1 hour. Prerequisite: course 113 concurrently. Discussion of topics and applications related to principles presented in course 113. Assigned topics each week show novel applications of the principles described in course 113; discussion of topics during class period. (P/NP grading only.)—S. (S.) Harada

##### 116. Plant Morphology and Evolution (5)

Lecture—3 hours; laboratory—4 hours. Prerequisite: introductory plant biology (e.g., Biological Sciences 2C, Plant Sciences 2). Introduction to the form, development and evolution of vascular plants. Emphasis given to the form and development of reproductive structures in ferns and seed-producing plants as a basis for determining evolutionary relationships. Not open for credit to students who have completed Plant Sciences 116. (Same course as Plant Sciences 116.) GE credit: SciEng | SE, VL.—W. (W.) Jernstedt

##### 117. Plant Ecology (4)

Lecture—3 hours; fieldwork—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or 2A, 2B, 2C; Plant Biology 111 recommended. The study of the interactions between plants, plant populations or vegetation types and their physical and biological environment. Special emphasis on California. Four full-day field trips and brief write-up of class project required. (Same course as Evolution and Ecology 117.)—F. (F.)

##### 119. Population Biology of Invasive Plants and Weeds (3)

Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or 2A, 2B, 2C; introductory statistics recommended. Origin and evolution of invasive plant species and weeds, reproduction and dispersal, seed ecology, modeling of population dynamics, interactions between invasive species, native species, and crops, biological control. Laboratories emphasize design of competition experiments and identification of weedy species. (Same course as Evolution and Ecology 119.) GE credit: SciEng | SE.—S. (S.) Rejmankov

##### 123. Plant-Virus-Vector Interaction (3)

Lecture—3 hours. Prerequisite: Biological Sciences 2A, Biological Sciences 101; course 105, Plant Pathology 120, and Entomology 100 recommended. Analysis of interactions necessary for viruses to infect plants. Interactions among insect vectors and host plants involved in the plant-virus life cycle. Evolutionary aspects of the molecular components in viral infection and modern approaches to the interdiction of viral movement. (Same course as Entomology 123 and Plant Pathology 123.) Offered in alternate years. GE credit: SE, SL, WE.—F. (F.) Lucas, Gilbertson, Ullman

##### 126. Plant Biochemistry (3)

Lecture—3 hours. Prerequisite: Biological Sciences 103 or 105. The biochemistry of important plant processes and metabolic pathways. Discussion of methods used to understand plant processes, including use of transgenic plants. (Same course as Molecular and Cellular Biology 126.) GE credit: SciEng | SE, SL.—W. (W.) Callis, Tian

##### 143. Evolution of Crop Plants (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Sciences 2 or Biological Sciences 1C or 2C. Origins of crops and agriculture, including main

methodological approaches, centers of crop biodiversity, dispersal of crops, genetic and physiological differences between crops and their wild progenitors, agriculture practiced by other organisms, and role and ownership of crop biodiversity. GE credit: SciEng or SocSci, Div, Wrt | SE or SS, SL, WE. —S. (S.) Gepts

#### **148. Introductory Mycology (4)**

Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Limited enrollment. Systematics, ecology, evolution, and morphology of fungi. Importance of fungi to humans. (Same course as Plant Pathology 148.) GE credit: SE. —F. McDonald, Rizzo

#### **189. Experiments in Plant Biology: Design and Execution (3)**

Laboratory/discussion—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or 2A, 2B, 2C, or the equivalent courses in Plant Sciences, and consent of the instructor. Provides an opportunity for undergraduate students to formulate experimental approaches to current questions in plant biology and to carry out their proposed experiments. May be repeated for credit for a total of 12 units. (P/NP grading only.)—F, W, S. (F, W, S.)

#### **190C. Research Conference in Plant Biology (1)**

Discussion—1 hour. Prerequisite: upper division standing in Plant Biology or related discipline; consent of instructor. Introduction to research methods in plant biology. Design of field or laboratory research projects, survey of appropriate literature, and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

#### **192. Internship (1-12)**

Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Technical and/or professional experience on or off campus. Supervised by a member of the Plant Biology Department faculty. May be repeated for credit. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

#### **194H. Special Study for Honors Students (1-5)**

Prerequisite: open only to majors of senior standing on honors list. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis. (P/NP grading only.)

#### **197T. Tutoring in Plant Biology (1-5)**

Discussion—2-6 hours. Prerequisite: upper division standing and consent of instructor. Assisting the instructor by tutoring students in one of the Department's regular courses. May be repeated for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

#### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

#### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

### **Professional**

#### **396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing; consent of instructor. Practical experience in acting as teaching assistant in Plant Biology courses. Learning activity: hands on experience in preparing for and conducting discussions, guiding student laboratory work, and the formulation of questions and topics for examinations. May be repeated for credit. (S/U grading only.)—F, W, S, Su. (F, W, S, Su.)

## **Plant Biology (A Graduate Group)**

Neelima Sinha, Ph.D., Chairperson of the Group

**Group Office.** 227A Life Sciences  
530-752-2981; Fax 530-752-8822  
<http://pbi.ucdavis.edu/>

#### **Faculty**

Diane Beckles, Ph.D., Associate Professor  
(*Plant Sciences*)

Alan Bennett, Ph.D., Professor (*Plant Sciences*)  
Alison Berry, Ph.D., Professor (*Plant Sciences*)  
Arnold Bloom, Ph.D., Professor (*Plant Sciences*)  
Eduardo Blumwald, Ph.D., Professor (*Plant Sciences*)  
Richard Bostock, Ph.D., Professor (*Plant Pathology*)  
Kent Bradford, Ph.D., Professor (*Plant Sciences*)  
Siobhan Brady, Ph.D., Associate Professor  
(*Plant Biology*)

Anne Britt, Ph.D., Professor (*Plant Biology*)  
Patrick Brown, Ph.D., Professor (*Plant Sciences*)  
Judy Callis, Ph.D., Professor  
(*Molecular and Cellular Biology*) Academic  
Senate Distinguished Teaching Award

Clare Casteel, Ph.D., Assistant Professor  
(*Plant Biology*)  
Gitta Coaker, Ph.D., Assistant Professor  
(*Plant Pathology*)

Luca Comai, Ph.D., Professor (*Plant Biology*)  
Douglas Cook, Ph.D., Professor (*Plant Pathology*)  
Carlos Crisosto, Ph.D., Professor (*Plant Sciences*)  
Abhaya Dandekar, Ph.D., Professor (*Plant Sciences*)  
Katayoon Dehesh, Ph.D., Professor (*Plant Biology*)  
Theodore Dejong, Ph.D., Professor (*Plant Sciences*)  
Savitramma Dinesh-Kumar, Ph.D., Professor  
(*Plant Biology*)

Georgia Drakakaki, Ph.D., Assistant Professor  
(*Plant Sciences*)  
Jorge Dubcovsky, Ph.D., Professor (*Plant Sciences*)  
Albert Fischer, Ph.D., Professor  
(*Plant Sciences*)

Charles Gasser, Ph.D., Professor  
(*Molecular and Cellular Biology*)  
Paul Gepts, Ph.D., Professor (*Plant Sciences*)  
Matthew Gilbert, Ph.D., Assistant Professor  
(*Plant Biology*)  
Thomas Gradziel, Ph.D., Professor (*Plant Sciences*)  
Andrew Groover, Ph.D., Assistant Professor  
(*Plant Biology*)

John Harada, Ph.D., Professor (*Plant Biology*)  
Academic Senate Distinguished Teaching Award  
Stacey Harmer, Ph.D., Professor (*Plant Biology*)  
Kentaro Inoue, Ph.D., Professor (*Plant Sciences*)  
Marie Jaseniuik, Ph.D., Associate Professor  
(*Plant Sciences*)  
Judy Jernstedt, Ph.D., Professor (*Plant Sciences*)  
Daniel Klienbenstein, Ph.D., Professor  
(*Plant Sciences*)

John Labavitch, Ph.D., Professor (*Plant Sciences*)  
Clark Lagarias, Ph.D., Professor  
(*Molecular and Cellular Biology*)

Bo Liu, Ph.D., Professor (*Plant Biology*)  
William Lucas, Ph.D., Professor (*Plant Biology*)  
Julin Maloof, Ph.D., Professor (*Plant Biology*)  
Karen McDonald, Ph.D., Professor and Associate  
Dean (*Chemical and Material Engineering*)  
Maeli Melotto, Ph.D., Assistant Professor  
(*Plant Sciences*)

Richard Michelmore, Ph.D., Professor  
(*Plant Sciences*)  
David Neale, Ph.D., Professor (*Plant Sciences*)  
Sharman O'Neill, Ph.D., Professor (*Plant Biology*)  
Kyaw Tha Paw, Ph.D., Professor  
(*Land, Air and Water Resources*)

Daniel Potter, Ph.D., Professor (*Plant Sciences*)  
Marcel Rejmanek, Ph.D., Professor  
(*Evolution and Ecology*)

Eliska Rejmankova, Ph.D., Associate Professor  
(*Plant Biology*)  
James Richards, Ph.D., Professor  
(*Land, Air and Water Resources*)

Pamela Ronald, Ph.D., Professor (*Plant Pathology*)  
Jeffrey Ross-Ibarra, Ph.D., Associate Professor  
(*Plant Sciences*)

Johanna Schmitt, Ph.D., Professor

(*Evolution and Ecology*)  
Ken Shackel, Ph.D., Professor (*Plant Sciences*)  
Neelima Sinha, Ph.D., Professor (*Plant Biology*)  
Dina St. Clair, Ph.D., Professor  
(*Plant Sciences*)

Venkatesan Sundaresan, Ph.D., Professor  
(*Plant Biology*)

Steve Theg, Ph.D., Professor (*Plant Biology*)  
Li Tian, Ph.D., Associate Professor (*Plant Sciences*)  
M. Andrew Walker, Ph.D., Professor  
(*Viticulture and Enology*)

John Yoder, Ph.D., Professor (*Plant Sciences*)  
Florence Zakharov, Ph.D., Assistant Professor  
(*Plant Sciences*)

Philipp Zerbe, Ph.D., Assistant Professor  
(*Plant Biology*)

#### **Emeriti Faculty**

Don Durzan, Ph.D., Professor (*Plant Sciences*)  
David Gilchrist, Ph.D., Professor Emeritus  
(*Plant Pathology*)

Donald J. Nevins, Ph.D., Professor (*Plant Sciences*)  
Donald Phillips, Ph.D., Professor (*Plant Sciences*)  
Carlos Quiros, Ph.D., Professor (*Plant Sciences*)  
Michael Reid, Ph.D., Professor (*Plant Sciences*)  
M W Silk, Ph.D., Professor Emeritus  
(*Land, Air and Water Resources*)  
T Hsiao, Ph.D., Professor Emeritus  
(*Land Air Water Resources*)

#### **Affiliated Faculty**

Carlos Crisosto, Ph.D., Pomologist and Specialist  
(*Plant Sciences*)

Andrew Groover, Ph.D., Associate Adjunct Professor  
(*Plant Biology*)

Cai-Zhong Jiang, Research Plant Physiologist  
(*Crops Path & Genetic Research*)

Takao Kasuga, Ph.D., Molecular Geneticist  
(*Plant Pathology*)

Ann Powell, Ph.D., Professional Research Biochemist  
(*Plant Sciences*)

Alan Rose, Ph.D., Associate Project Scientist  
(*Molecular & Cellular Biology*)

Thomas Tai, Ph.D., Associate in the Agricultural  
Experiment (*Plant Sciences*)

Allen Van Deynze, Ph.D., Professional Researcher  
(*Plant Sciences*)

**Graduate Study.** The Graduate Group in Plant Biology offers programs of study and research leading to the M.S. and Ph.D. degrees. The program prepares students for careers in teaching and research at universities and colleges, government and industrial laboratories. The graduate curriculum provides both a breadth in the discipline and in-depth study and research in one of four areas of specialization: cell and developmental biology; environmental and integrative biology; molecular biology, biochemistry and genomics; and systematics and evolutionary biology. These areas of specialization permit individual study and research into diverse aspects of plant biology, including anatomy, biochemistry, biotechnology, cell biology, cytology, developmental biology, ecology, genetics, genomics, molecular biology, morphology, paleo-botany, physiology, population biology, systematics, and weed science. The graduate adviser, the major professor, and the student will design a program of advanced courses to meet individual academic needs within one of the specializations.

**Preparation.** For both the M.S. and Ph.D. programs, a level of scholastic development equivalent to a Bachelor's degree in biological sciences from a recognized college or university is required. Courses in the following areas are considered to be prerequisite to the advanced degrees in Plant Biology: biology, inorganic chemistry, organic chemistry, introductory physics, genetics, plant development and structure, biochemistry, introductory plant physiology, calculus, introductory statistics, ecology/systematics/evolution, and cell/molecular biology. Limited deficiencies can be made up after admission.

**Graduate Adviser.** Contact the Group office.

**Courses in Plant Biology (PBI)****Graduate****200A. PBGG Core Course Series—Fall quarter (5)**

Lecture—3 hours; discussion—2 hours. Prerequisite: graduate standing; a broad background of undergraduate-level coursework in Plant Biology is recommended. The first of three PBGG graduate core courses. Coverage includes (1) plant genes, (2) biotechnology, (3) genomes and gene flow, (4) principles of plant systematics, and (5) the evolution of flowering plants.—F. (F.) Comai, Gepts, Jernstedt, Potter

**200B. PBGG Core Course Series—Winter quarter (5)**

Lecture—3 hours; discussion—2 hours. Prerequisite: course 200A. The second of three PBGG graduate core courses. Coverage includes (1) embryo development, (2) cytoskeleton and vesicle trafficking, (3) cell walls, (4) cell growth, (5) secondary metabolism, (6) plastids and (7) senescence.—W. (W.) Bradford, Drakakaki, Gilchrist, Harada, Inoue, Labavitch, Sundaresan, Tian

**200C. PBGG Core Course Series—Spring quarter (5)**

Lecture—3 hours; discussion—2 hours. Prerequisite: course 200A and 200B. The third of three PBGG graduate core courses. Coverage includes (1) plant water relations, (2) cellular & long distance transport processes, (3) mineral nutrition, (4) environmental impacts on growth & development, (5) stress perception & responses, (6) canopy processes, and (7) plant interactions with other organisms.—S. (S.) Blumwald, Brown, Cook, DeJong, Gilbert, Shackel

**203N. Biology of the Plant Cell (4)**

Lecture—3 hours; discussion/laboratory—2 hours. Prerequisite: Plant Biology 111 or Biological Sciences 104, or the equivalent. Open to senior undergraduate students in Plant Biology major. Recent progresses in plant cell biology. Intracellular motility in plant cells. Common techniques associated with the progress of plant cell biology. Offered irregularly. (S/U grading only.)—Liu

**210. Plant Ecophysiology (3)**

Lecture—3 hours. Prerequisite: Plant Biology 111, 112, 117. Study of the mechanisms of physiological adaptation of plants to their environment. Offered in alternate years.—W.

**212. Physiology of Herbicidal Action (3)**

Lecture—3 hours. Prerequisite: Plant Biology 112, 122. Study of the fundamental processes involved in the physiological action of herbicides. Detailed consideration of the fate of herbicides in plants. Offered in alternate years.—S.

**214. Higher Plant Cell Walls (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: Plant Biology 112, and a course in biochemistry. Lectures focus on the structure, analysis, synthesis, and development-related metabolism of cell walls. Discussions center on analysis of scientific papers related to lecture topics. Offered in alternate years.—F. Drakakaki, Labavitch

**220. Plant Developmental Biology (4)**

Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: plant anatomy, physiology, and biochemistry. A survey of the concepts of plant development and organization. Examines plant cells, tissues, and organs with special emphasis on experimental evidence for mechanisms regulating developmental processes. Offered in alternate years.—Sinha

**223. Special Topics in Scientific Method (2)**

Discussion—2 hours. Examine the historical and philosophical background of the scientific method. Analyze the rational, perceptual, causal, creative and social aspects of scientific knowledge. Clarify the roles of reason, experimentation and creativity in scientific research. (S/U grading only.)—F. (F.) Bradford

**227. Plant Molecular Biology (4)**

Lecture/discussion—4 hours. Prerequisite: Molecular and Cellular Biology 121 or 161. Molecular aspects of higher plant biology with emphasis on gene expression. Plant nuclear and organelle genome organization, gene structure, mechanisms of gene regulation, gene transfer, and special topics related to development and response to biological and environmental stimuli. Offered in alternate years.—Britt, Sinha

**229. Molecular Biology of Plant Reproduction (3)**

Lecture—3 hours. Molecular genetic basis of plant reproduction. Emphasis on understanding developmentally regulated gene expression as it relates to the major changes that occur during plant reproduction and on the genetic control of flowering. Offered in alternate years.—O'Neill

**290A. Faculty Seminar (1)**

Discussion—1 hour. Restricted to Plant Biology (PBGG) graduate students. Discussion of research area of seminar speakers in Plant Biology Graduate Group Seminar Series. May be repeated six times for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**290B. Seminar (1)**

Seminar—1 hour. Seminars presented by visiting scientists on research topics of current interest. (S/U grading only.)—F, W, S. (F, W, S.)

**290C. Research Conference in Botany (1)**

Discussion—1 hour. Prerequisite: graduate standing and/or consent of instructor. Presentation and discussion by faculty and graduate students of research projects in botany. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**291. Graduate Student Seminar in Plant Biology (1)**

Seminar—1 hour. Prerequisite: graduate student standing. Student-given seminars on topics in plant biology, with critiques by instructor and peers. How to give a seminar, including preparation of visual and other teaching aids. Topic determined by instructor in charge. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**292. Seminars in Plant Biology (1)**

Seminar—1 hour. Prerequisite: consent of instructor. Review of current literature in botanical disciplines. Disciplines and special subjects to be announced quarterly. Students present and analyze assigned topics. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**293. Seminar in Postharvest Biology (1)**

Discussion—1 hour. Prerequisite: consent of instructor; open to advanced undergraduates. Intensive study of selected topics in the postharvest biology of fruits, vegetables, and ornamentals. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**297T. Tutoring in Plant Biology (1–5)**

Tutorial—3–15 hours. Offers graduate students, particularly those not serving as teaching assistants, the opportunity to gain teaching experience. (S/U grading only.)

**298. Group Study (1–5)**

May be repeated up to four times for credit. (S/U grading only.)

**299. Research (1–12)**

Prerequisite: graduate standing. (S/U grading only.)

**Professional****390. The Teaching of Plant Biology (2)**

Discussion—2 hours. Prerequisite: graduate standing; concurrent appointment as a teaching assistant in Plant Biology. Consideration of the problems of teaching botany, especially of preparing for and conducting discussions, guiding student laboratory work, and the formulation of questions and topics for examinations. (S/U grading only.)—F, W, S. (F, W, S.)

**Plant Pathology**

(College of Agricultural and Environmental Sciences)  
David M. Rizzo, Ph.D., Chairperson of the Department

**Department Office.** 354 Hutchison Hall  
530-752-0300; <http://plantpathology.ucdavis.edu/>

**Faculty**

Richard M. Bostock, Ph.D., Professor  
Gitta Coaker, Ph.D., Associate Professor  
Clare Casteel, Ph.D., Assistant Professor  
Douglas R. Cook, Ph.D., Professor  
Lynn Epstein, Ph.D., Professor  
Bryce W. Falk, Ph.D., Distinguished Professor  
Robert L. Gilbertson, Ph.D., Professor  
Thomas R. Gordon, Ph.D., Professor  
Johan Leveau, Ph.D., Associate Professor  
James D. MacDonald, Ph.D., Emeritus  
Neil McRoberts, Ph.D., Associate Professor  
David Rizzo, Ph.D., Professor  
Pamela C. Ronald, Ph.D., Professor  
Ioannis Stergiopoulos, Ph.D., Assistant Professor  
Neal K. VanAlfen, Ph.D., Professor Emeritus

**Emeriti Faculty**

George Bruening, Ph.D., Professor Emeritus  
Robert N. Campbell, Ph.D., Professor Emeritus  
R. Michael Davis, Ph.D., Professor Emeritus  
John M. Dunivin, Ph.D., Professor Emeritus  
Raymond G. Grogan, Ph.D., Professor Emeritus  
Clarence I. Kado, Ph.D., Professor Emeritus  
Srecko John M. Mirceticich, Ph.D., Lecturer Emeritus (USDA)  
Jerry K. Uyemoto, Ph.D., Lecturer Emeritus (USDA)  
Robert K. Webster, Ph.D., Professor Emeritus  
Valerie Williamson, Ph.D., Professor Emerita

**Affiliated Faculty**

Kendra Baumgartner, Ph.D., (USDA)  
Greg Browne, Ph.D., (USDA)  
Daniel Kluepfel, Ph.D., (USDA)  
Deborah A. Golino, Ph.D., Lecturer and Specialist in Cooperative Extension  
W. Douglas Gubler, Ph.D., Lecturer and Specialist in Cooperative Extension  
Themis Michailides, Ph.D., Lecturer and Plant Pathologist in the Agricultural Experiment Station  
Adib Rowhani, Ph.D., Lecturer and Project Scientist  
Krishna Subbarao, Ph.D., Lecturer and Specialist in Cooperative Extension  
Mysore Sudarshana, Ph.D., (USDA)  
Takao Kasuga, Ph.D., Lecturer (USDA)  
Florent Trouillas, Ph.D., Lecturer & Assistant Specialist in Cooperative Extension

**Related Major Program.** See the major in Plant Biology, on page 509.

**Graduate Study.** The Department of Plant Pathology offers programs of study and research leading to the M.S. and Ph.D. degrees. Information can be obtained from the graduate adviser. See also the Graduate Studies, on page 120.

**Graduate Advisers.** L. Epstein, G.L. Coaker, R.M. Bostock

**Courses in Plant Pathology (PLP)****Lower Division****40. Edible Mushroom Cultivation (2)**

Lecture—1 hour; laboratory/discussion—3 hours. Prerequisite: Biological Sciences 10 or Microbiology 20 recommended. Principles and practices of growing edible mushrooms, including culture maintenance, basic mushroom substrate preparation, composting, spawn generation techniques, inoculation methods, harvesting, and pests and pest management.—W. (W.)

**90. Introduction to Global Disease Biology****(1)**

Seminar—1 hour. Introduction to the Global Disease Biology major, research and internship opportunities, and potential career paths in human, animal, and plant health. Communication, ethics and the nature of science. (P/NP grading only.)—F. (F.) Rizzo

**Upper Division****101. Epidemiology (4)**

Lecture—2 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: Science and Society 13; Biological Science 2A, 2B, 2C; Statistics 13, 100 or Plant Sciences 120. Principles and practice of epidemiology as applied to human, animal, and plant populations and the environment in which these populations co-exist. Quantitative analysis of both infectious and non-infectious disease. Inter-dependence between epidemiological analysis, decision-making and policy formulation will be highlighted. GE credit: SciEng | QL, SE.—W. (W.) McRoberts, Papageorgiou

**102. Disease Intervention and Policy (4)**

Lecture—3 hours; discussion—1 hour; project. Prerequisite: course 101; Science and Society 13; Biological Sciences 2A, 2B, 2C; Pathology, Microbiology and Immunology 129Y; Medicine and Epidemiology 158. Examination of the prevention and treatment of diseases affecting humans, animals, and plants. Case studies will illustrate the merits of a unified approach to promoting health at local, regional, and global scales. GE credit: SciEng | OL, SE, SL.—S. (S.) Rizzo

**103. The Microbiome of People, Animals, and Plants (3)**

Lecture—3 hours. Prerequisite: Biological Science 2A, 2B, 2C. Examination of the structure and function of microbial communities that live inside and on host organisms. Introduction to general concepts of the microbiome and microbiota, and their relationship to host health and disease. GE credit: SciEng | QL, SE.—F. (F.) Cook, Leveau

**120. Introduction to Plant Pathology (4)**

Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1C; Microbiology 102 recommended. The nature, cause, and control of plant diseases.—F, S. (F, S.) Casteel, Epstein

**123. Plant-Virus-Vector Interaction (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 2A, Biological Sciences 101; Plant Biology 105, course 120, and Entomology 100 recommended. Analysis of interactions necessary for viruses to infect plants. Interactions among insect vectors and host plants involved in the plant-virus life cycle. Evolutionary aspects of the molecular components in viral infection and modern approaches to the interdiction of viral movement. (Same course as Entomology 123 and Plant Biology 123.) Offered in alternate years. GE credit: SE, SL, WE.—F. Lucas, Gilbertson, Ullman

**130. Fungal Biotechnology and Biochemistry (3)**

Lecture—3 hours. Prerequisite: Plant Biology 119, Biological Sciences 103. How fundamental physiological and biochemical activities of fungi impact the destructive and beneficial roles of these organisms in nature. Utilization and manipulation of fungi for biotechnological and industrial applications.—W. (S.) Stergiopolous

**135. Field Identification of Mushrooms (1)**

Field work; three-day mandatory field trip. Prerequisite: introductory course in biological sciences; course in mycology recommended. Collection and identification of mushrooms and other fleshy fungi based on macro and microscopic features. (P/NP grading only.)—W. (W.)

**140. Agricultural Biotechnology and Public Policy (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: high school level biology, including genetics; Biological Sciences 10 recommended. Examination of the development and deployment of agricultural biotechnologies, particularly transgenic crop plants, micro-

organisms and animals, with consideration of conventional agriculture, public perceptions of technologies, food safety, environmental impact, public policies and regulations. GE credit: SciEng, Wrt | SL.—S. (S.) Cook

**148. Introductory Mycology (4)**

Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Limited enrollment. Systematics, ecology, evolution, and morphology of fungi. Importance of fungi to humans. (Same course as Plant Biology 148.) GE credit: SE.—F. Rizzo

**150. Fungal Ecology (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 1C or equivalent. The ecological roles of fungi as saprobes, mutualists and parasites in native and managed ecosystems. Physiological and reproductive strategies associated with adaptations to diverse habitats.—W. (W.) Gordon

**185. Advanced Mushroom Taxonomy (2)**

Laboratory/discussion—3 hours; fieldwork—1 hour. Prerequisite: course 135 or 148, and Biological Sciences 101 or the equivalent. Class size limited to 12 students. Microscopic and molecular methods used in the identification of mushroom species; molecular characterization including PCR-amplification of ribosomal nuclear DNA, digestion of the product with restriction enzymes, and DNA sequencing; a one-day field trip is required. Offered in alternate years.—F.

**192. Internship (1-12)**

Internship—3-36 hours. Prerequisite: course 120 and consent of instructor. Work experience off and on campus, supervised by a member of the faculty. (P/NP grading only.)

**198. Directed Group Study (1-5)**

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.)

**Graduate****201A. Impacts, Mechanisms and Control of Plant Disease (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 120, graduate student status in the Plant Pathology Graduate Program, or consent of instructor. A case-studies approach to analysis of plant diseases caused by bacteria, fungi, oomycetes, and viruses, including impacts, etiology, pathogen taxonomy and epidemiology, biochemical and genetic aspects of pathogen-host interactions, virulence and resistance, and approaches to disease control.—W. (W.) Leveau

**201B. Impacts, Mechanisms and Control of Plant Disease (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: course 120, course 201A, and graduate student status in the Plant Pathology Graduate Program, or consent of instructor. A case-studies approach to analysis of plant diseases, including emerging diseases, caused by bacteria, fungi, nematodes, and oomycetes: impacts, etiology, pathogen taxonomy, epidemiology, biochemical and genetic aspects of pathogen-host interactions, virulence, resistance, disease control and statistical analysis. Offered in alternate years.—S. (S.) McRoberts

**205A. Diseases of Vegetable and Field Crops (3)**

Lecture/discussion—3 hours; fieldwork—3 hours. Prerequisite: course 120. Clinical study of diseases of vegetable and field crops with emphasis on etiology, epidemiology, diagnosis, and control. Field trips required. Offered in alternate years.—S. Gilbertson

**205B. Diseases of Vegetable and Field Crops—Summer Field Trip (1)**

Fieldwork—3 hours. Prerequisite: courses 120 and 205A. Continuation of course 205A—four-day field trip investigating diseases of vegetable and field crops (Deferred grading only, pending completion of sequence. S/U grading only.)—Su. (Su.) Gilbertson

**206A. Diseases of Fruit, Nut, and Vine Crops (3)**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 120; Plant Biology 119. Course 205 may be taken concurrently. Clinical study of fruit, nut, and vine crops diseases with emphasis on etiology, epidemiology, diagnosis, and control. (Deferred grading only, pending completion of sequence.) Offered in alternate years.—S. (S.) Kirkpatrick

**206B. Diseases of Fruit, Nut, and Vine Crops (1)**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 120; Plant Biology 119. Course 205 may be taken concurrently. Clinical study of fruit, nut, and vine crops diseases with emphasis on etiology, epidemiology, diagnosis, and control. Offered in alternate years. (Deferred grading only, pending completion of sequence.)—Su. (Su.)

**210. Biochemistry and Molecular Biology of Plant-Microbe Interaction (4)**

Lecture/discussion—4 hours. Prerequisite: Biological Sciences 101, 102, 103, and 104, or the equivalent. Discussion of plant-microbe interactions, focused on the underlying cellular, biochemical, and molecular events that determine the diseased state.—W. (W.) Bostock, Coaker

**217. Molecular Genetics of Fungi (3)**

Lecture—3 hours. Prerequisite: graduate standing in a biological science, Biological Sciences 101, 103, Molecular and Cellular Biology 161, Plant Biology 119, courses 130, 215X; Microbiology 215 recommended. Advanced treatment of molecular biology and genetics of filamentous fungi and yeasts, including gene structure, organization and regulation; plant pathogenesis; secretion; control of reproduction; molecular evolution; transformation; and gene manipulation. (Same course as Biological Chemistry 217.) Offered in alternate years.—W.

**224. Advanced Mycology (4)**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 148 or Plant Biology 148 or consent of instructor. Systematics, evolution, and ecology of the fungi. Topics include modern techniques and theories on classification of fungi, species concepts, sexual compatibility and vegetative compatibility. Laboratories emphasize various approaches to fungal identification. Offered in alternate years.—S. Epstein, Rizzo

**228. Plant Bacteriology (5)**

Lecture—2 hours; laboratory—9 hours. Prerequisite: course 120; Microbiology 2 or the equivalent; Biological Sciences 102, 103. Study of bacteria which have a saprophytic, symbiotic, or parasitic association with higher and lower plants. Clinical and molecular methods for identification and classification of these bacteria. Offered in alternate years.—(F.) Kirkpatrick, Gilbertson

**230. Plant Virology (3)**

Lecture—3 hours. Prerequisite: upper division or graduate course in molecular biology or graduate student in plant pathology. Viruses as causal agents of plant disease and as tools for manipulating plants; structures of virus particles; mechanisms of transmission, replication, and spread in the plant; cytology and molecular biology in susceptible and resistant reactions to virus infection; virus disease control. Only 2 units of credit to students who have completed Microbiology 262. Not open for credit to students who have completed course 226. Offered in alternate years.—W. Bruening, Falk

**290. Seminar (1)**

Seminar—1 hour. Review and evaluation of current research in plant pathology. (S/U grading only.)—F, W, S. (F, W, S.)

**290C. Advanced Research Conference (1)**

Seminar—1 hour. Prerequisite: course 120 or consent of instructor. Presentation, evaluation, and critical discussions of research activities in the area of advanced plant pathology; primarily designed for graduate students. (S/U grading only.)—F, W, S. (F, W, S.)

**291. Seminar in Molecular Plant Pathology (1)**

Seminar—1 hour. Prerequisite: course 120 or consent of instructor. Review and evaluation of current literature and research in biochemistry and molecular biology of plant-microbe interactions. May be repeated for credit. (S/U grading only.)—F, W. (F, W.) Bostock, Coaker, Cook, Gilchrist, Van Alfen

**295. Seminar in Mycology (1)**

Seminar—1 hour. Review and evaluation of current literature and research in mycology. May be repeated for credit. (S/U grading only.)—S. (S.) Rizzo

**298. Special Group Study (1-5)****299. Research (1-12)**

(S/U grading only.)

## Plant Physiology

**See Plant Biology, on page 509; and Plant Biology (A Graduate Group), on page 511.**

## Plant Sciences

(College of Agricultural and Environmental Sciences)

Chris van Kessel, Ph.D., Chairperson of the Department

**Department Office.** 1210 Plant and Environmental Sciences 530-752-1703;  
<http://www.plantsciences.ucdavis.edu/>

**Faculty**

Kassim Al-Khatib, Ph.D., Professor  
 Diane M. Beckles, Ph.D., Associate Professor  
 Alan B. Bennett, Ph.D., Distinguished Professor  
 Alison M. Berry, Ph.D., Professor  
 Arnold J. Bloom, Ph.D., Distinguished Professor  
 Eduardo Blumwald, Ph.D., Professor  
 Kent J. Bradford, Ph.D., Distinguished Professor  
 Patrick H. Brown, Ph.D., Professor  
 E. Charles Brummer, Ph.D., Professor  
 Mary Cadenasso, Ph.D., Professor  
 Abhaya M. Dandekar, Ph.D., Professor  
 Joseph M. DiTomaso, Ph.D., Professor  
 Georgia Drakakaki, Ph.D., Associate Professor  
 Jorge Dubcovsky, Ph.D., Distinguished Professor  
 Jan Dvorak, Ph.D., Distinguished Professor  
 Valerie Eviner, Ph.D., Associate Professor  
 Albert J. Fischer, Ph.D., Professor  
 Amélie Gaudin, Ph.D., Assistant Professor  
 Paul L. Gepts, Ph.D., Distinguished Professor  
 Matthew Gilbert, Ph.D., Assistant Professor  
 Thomas M. Gradziel, Ph.D., Professor  
 Kentaro Inoue, Ph.D., Professor  
 Marie A. Jasieniuk, Ph.D., Associate Professor  
 Judy Jernstedt, Ph.D., Professor  
 Daniel J. Klebenstein, Ph.D., Professor  
 Steven J. Knapp, Ph.D., Professor  
 Emilio A. Laca, Ph.D., Professor  
 Andrew M. Latimer, Ph.D., Associate Professor  
 J. Heinrich Lieb, Ph.D., Professor  
 Maeli Melotto, Ph.D., Assistant Professor  
 Richard W. Michelmore, Ph.D., Distinguished Professor  
 David B. Neale, Ph.D., Professor  
 Daniel Potter, Ph.D., Professor  
 Jeffrey S. Ross-Ibarra, Ph.D., Associate Professor  
 Daniel E. Runcie, Ph.D., Assistant Professor  
 Dina St. Clair, Ph.D., Professor  
 Kenneth A. Shackel, Ph.D., Professor  
 Venkatesan Sundaresan, Ph.D., Professor  
*(Plant Biology)*  
 Kenneth W. Tate, Ph.D., Professor  
 Li Tian, Ph.D., Associate Professor  
 Chris van Kessel, Ph.D., Distinguished Professor  
 Astrid Volder, Ph.D., Associate Professor  
 John I. Yoder, Ph.D., Professor  
 Truman P. Young, Ph.D., Professor  
 Florence Zakharov, Ph.D., Associate Professor

Maciej Zwieniecki, Ph.D., Associate Professor

**Emeriti Faculty**

Steffen Abel, Ph.D., Professor Emeritus  
 Husein Ajwa, Ph.D., Specialist in Cooperative Extension, Emeritus  
 Michael G. Barbour, Ph.D., Professor Emeritus  
*Academic Senate Distinguished Teaching Award*  
 Fredrick A. Bliss, Ph.D., Professor Emeritus  
 R. William Breidenbach, Ph.D., Lecturer Emeritus  
 Ivan W. Buddenhagen, Ph.D., Professor Emeritus  
 David W. Burger, Ph.D., Professor Emeritus  
 William J. Clawson, M.S., Specialist in Cooperative Extension, Emeritus  
 Montague W. Demment, Ph.D., Professor Emeritus  
 Theodore M. DeJong, Ph.D., Professor Emeritus  
 R. Ford Denison, Ph.D., Professor Emeritus  
 Don J. Durzan, Ph.D., Professor Emeritus  
 Clyde L. Elmore, Ph.D., Specialist in Cooperative Extension, Emeritus  
 Theodore C. Foin, Jr., Ph.D., Professor Emeritus  
 Shu Geng, Ph.D., Professor Emeritus  
 Melvin George, Ph.D., Specialist in Cooperative Extension, Emeritus  
 William H. Griggs, Ph.D., Professor Emeritus  
 James A. Harding, Ph.D., Professor Emeritus  
 Charles E. Hess, Ph.D., Professor Emeritus  
 James E. Hill, Ph.D., Specialist in Cooperative Extension, Emeritus  
 Ray C. Huffaker, Ph.D., Professor Emeritus  
 Lee Jackson, Ph.D., Specialist in Cooperative Extension, Emeritus  
 Subodh K. Jain, Ph.D., Professor Emeritus  
 R. Scott Johnson, Ph.D., Specialist in Cooperative Extension, Emeritus  
 Milton B. Jones, Ph.D., Lecturer Emeritus  
 John M. Labavitch, Ph.D., Professor Emeritus  
 W. Thomas Lanini, Ph.D., Lecturer  
 William C. Liebhardt, Ph.D., Specialist in Cooperative Extension, Emeritus  
 William M. Longhurst, Ph.D., Professor Emeritus  
 James M. Lyons, Ph.D., Professor Emeritus  
 Vern L. Marble, Ph.D., Specialist in Cooperative Extension, Emeritus  
 Muhammad Marrush, Ph.D., Lecturer Emeritus  
 George C. Martin, Ph.D., Professor Emeritus  
 Gale H. McGranahan, Ph.D., Specialist in Cooperative Extension, Emeritus  
 Warren C. Micke, M.S., Specialist in Cooperative Extension, Emeritus  
 Donald J. Nevins, Ph.D., Professor Emeritus  
 Robert F. Norris, Ph.D., Professor Emeritus  
 Jack L. Paul, Ph.D., Professor Emeritus  
 Donald A. Phillips, Ph.D., Professor Emeritus  
 Richard E. Plant, Ph.D., Professor Emeritus  
 Vito S. Polito, Ph.D., Professor Emeritus  
 Calvin O. Qualset, Ph.D., Professor Emeritus  
 Carlos F. Quiros, Ph.D., Professor Emeritus  
 Charles A. Raguse, Ph.D., Professor Emeritus  
 D. William Rains, Ph.D., Professor Emeritus  
 David E. Ramos, Ph.D., Specialist in Cooperative Extension, Emeritus  
 Lawrence Rappaport, Ph.D., Professor Emeritus  
 Michael S. Reid, Ph.D., Professor Emeritus  
 Kevin J. Rice, Ph.D., Professor Emeritus  
 Roger J. Romani, Ph.D., Professor Emeritus  
 Vincent Rubatzky, Ph.D., Specialist in Cooperative Extension, Emeritus  
 Kay Ryugo, Ph.D., Professor Emeritus  
 Mikal E. Salveit, Ph.D., Professor Emeritus  
 Charles W. Schaller, Ph.D., Professor Emeritus  
 Douglas V. Shaw, Ph.D., Professor Emeritus  
 Steven Temple, Ph.D., Specialist in Cooperative Extension, Emeritus  
 Robert L. Travis, Ph.D., Professor Emeritus  
 Raymond C. Valentine, Ph.D., Professor Emeritus  
 Ronald E. Voss, Ph.D., Specialist in Cooperative Extension, Emeritus  
 Barbara D. Webster, Ph.D., Professor Emeritus  
 Steven A. Weinbaum, Ph.D., Professor Emeritus  
 Lin L. Wu, Ph.D., Professor Emeritus  
 Masatoshi Yamaguchi, Ph.D., Professor Emeritus

**Affiliated Faculty**

Marita Cantwell, Ph.D., Lecturer and Specialist in Cooperative Extension

Roger T. Chetelat, Ph.D., Lecturer and Agronomist

Carlos H. Crisosto, Ph.D., Lecturer and Specialist in Cooperative Extension

Richard Y. Evans, Ph.D., Lecturer and Specialist in Cooperative Extension

Steven A. Fennimore, Ph.D., Lecturer and Specialist in Cooperative Extension

Louise Ferguson, Ph.D., Lecturer and Specialist in Cooperative Extension

Elise Gornish, Ph.D., Lecturer and Assistant Specialist in Cooperative Extension

Bradley Hanson, Ph.D., Specialist in Cooperative Extension

Timothy K. Hartz, Ph.D., Lecturer, Agronomist and Specialist in Cooperative Extension

Robert B. Hutmacher, Ph.D., Agronomist and Specialist in Cooperative Extension

Stephen R. Kaffka, Ph.D., Lecturer and Specialist in Cooperative Extension

Gurdev Khush, Ph.D., Adjunct Professor

Bruce Lampinen, Ph.D., Lecturer and Specialist in Cooperative Extension

Bruce A. Linquist, Ph.D., Lecturer and Associate Specialist in Cooperative Extension

Mark E. Lundy, Ph.D., Lecturer and Assistant Specialist in Cooperative Extension

David J. Mackill, Ph.D., Adjunct Professor

Elizabeth J. Mitcham, Ph.D., Lecturer, Pomologist and Specialist in Cooperative Extension

Jeffrey P. Mitchell, Ph.D., Lecturer, Horticulturist and Specialist in Cooperative Extension

Lorence R. Oki, Ph.D., Lecturer and Associate Specialist in Cooperative Extension (Plant Sciences, Human Ecology)

Dan E. Parfitt, Ph.D., Lecturer and Pomologist

Daniel H. Putnam, Ph.D., Lecturer, Agronomist and Specialist in Cooperative Extension

Leslie M. Roche, Ph.D., Lecturer and Assistant Specialist in Cooperative Extension

Johan W. Six, Ph.D., Adjunct Professor

Trevor V. Suslow, Ph.D., Lecturer, Postharvest Horticulturist and Specialist in Cooperative Extension

Allen Van Deynze, Ph.D., Lecturer and Researcher

**Major Programs.** See Biotechnology, on page 196, Ecological Management and Restoration, on page 250, Environmental Horticulture and Urban Forestry, on page 324.

**Related Courses.** See the Biotechnology, Environmental Horticulture, Horticulture and Agronomy, and Plant Biology course listings.

**Graduate Study.** For related graduate study, see the M.S. degree program in International Agricultural Development, and the M.S. and Ph.D. degree programs in the graduate groups of Horticulture and Agronomy, Plant Biology, Ecology, Genetics, Geography, and Soils and Biogeochemistry. See also Graduate Studies, on page 120.

**The Major Program**

The Plant Sciences major is designed for students who are interested in a scientific understanding of how plants grow and develop in managed agricultural ecosystems and how plant products are utilized for food, fiber and environmental enhancement. Advances in science and technology have provided new insights and options for using plants to address the issues associated with providing renewable food, fiber and energy resources for a growing global population while minimizing adverse impacts on the natural environment. Graduates in Plant Sciences are able to apply their skills and knowledge to a diverse range of agricultural and environmental goals or pursue advanced degrees in plant sciences.

**The Program.** The curriculum provides depth in the biological and physical sciences and a sound understanding of how plants obtain and utilize resources from their environment to sustain their growth and development. The influences of genetics, management systems and environmental inputs on crop development and productivity are emphasized along with the postharvest preservation and marketing of plant products. Students will develop an area of specialization with options in Crop Production,

Plant Genetics and Breeding, or Postharvest Biology and Technology. An Individual option is also available to match specific subject matter or career goal interests in the plant sciences. All students gain practical experience through a combination of practical laboratory courses and internships. Students may also pursue an Honors thesis in their senior year.

**Career Alternatives.** Graduates from this program are prepared to pursue a wide range of careers, including various technical and management positions in agricultural and business enterprises, farming, or consulting; public, private, and non-profit agencies; Cooperative Extension; international development; teaching; or agricultural and environmental journalism and communication services. Graduates are qualified to pursue graduate studies in the natural and agricultural sciences, such as plant biology, genetics, breeding, horticulture, agronomy, biotechnology, ecology, environmental studies, pest management, education, or business management.

### B.S. Major Requirements:

	UNITS
--	-------

#### Preparatory Subject Matter.....51-68

Biological Sciences 2A, 2B .....	10
Plant Sciences 2 .....	4
Chemistry 2A, 2B, 2C .....	15
Chemistry 8A, 8B or 118A, 118B, 118C .....	6-12
Physics 1A, 1B or 7A, 7B, 7C .....	6-12
Mathematics 16A, 16B, or 17A, 17B....	6-8
Plant Sciences 120.....	4
Applied Biological Systems Technology 49 or Plant Sciences 49 (recommended) .....	2-3

#### Depth Subject Matter .....36-39

Plant Sciences 100A, 100B, 100C .....	9
Plant Sciences 100AL, 100BL, 100CL.....	6
Plant Sciences 152.....	4
Evolution and Ecology 100 or Plant Biology 102 or 108 or 143 .....	3-5
Plant Biology 117 or Plant Sciences 147 and 147L or Plant Sciences 150 or Environmental Horticulture 160 and 160L.....	4
Plant Pathology 120or Entomology 110or Nematology 100or Plant Sciences 105 or 176.....	3-5
Plant Sciences 101 .....	3
Internship or research, must be approved by master adviser .....	3

#### Areas of Specialization (choose one)

#### Crop Production Option .....23-28

Complete two courses in pest management not completed for the depth subject matter: Plant Pathology 120, Entomology 110, Nematology 100or Plant Sciences 105 or 176, Viticulture and Enology 118 .....	6-9
Soil Science 100.....	5
Plant Sciences 171 .....	4
Agricultural and Resource Economics 15 or Economics 1A.....	4
Select two courses from: Plant Sciences 110A, 110B, 110C, 112, 113, 114, 170A, 170B, Environmental Horticulture 125... .	4-6

#### Plant Breeding and Genetics

#### Option.....23-28

Biological Sciences 101 .....	4
Plant Sciences 154.....	4
Biotechnology 160.....	3
Biotechnology 161B.....	4
Plant Sciences 171 .....	4
Restricted Electives.....	4-9
Select two courses from: Plant Sciences 110A, 110C, 112, 113, 114, 141, 158, 170A, 170B, Environmental Horticulture 125, 150, International Agricultural Development 170, Agricultural and Resource Economics 100A, 130, 138, Biotechnology 150, Hydrology 124	4-6

#### Postharvest Biology and Technology

#### Option.....23

Plant Sciences 172 .....	4
Plant Sciences 173 .....	4

Plant Sciences 174.....	3
Plant Sciences 196 .....	3
Restricted Electives .....	9
Select from: Agricultural and Resource Economics 100A, 130, Food Science and Technology 107, 109, 131, Plant Sciences 212	212

#### Individual Option.....23

Select a minimum of 25 upper division units, with approval from a faculty adviser, to form a coherent program of study resulting in expertise and competence in a sub-discipline of plant sciences.

#### Total Units for the Major .....110-135

**Major Adviser.** Daniel Potter

**Advising Center** for the major is located in 1220 Plant and Environmental Sciences 530-752-1715.

### Courses in Plant Sciences (PLS)

(Formerly courses in Agricultural Management and Rangeland Resources, Agronomy, Crop Science and Management, Plant Biology, Pomology, Range Science and Vegetable Crops.)

#### Lower Division

##### 1. Agriculture, Nature and Society (3)

Lecture—2 hours; discussion/laboratory—1 hour. Multiple perspectives and connections between natural sciences, social sciences, and agriculture. Emphasizes agriculture's central position between nature and society and its key role in our search for a productive, lasting and hospitable environment. Several full-period field trips provide hands-on learning. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 1. (Former Course Agricultural Management and Rangeland Resources 1.) GE credit: SciEng | SE.—F. (F.) Gradziel

##### 2. Botany and Physiology of Cultivated Plants (4)

Lecture—3 hours; discussion/laboratory—3 hours. Prerequisite: high school course in biology and chemistry recommended. A holistic introduction to the underlying botanical and physiological principles of cultivated plants and their response to the environment. Includes concepts behind plant selection, cultivation, and utilization. Laboratories include discussion and interactive demonstrations. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 2. (Former course Agricultural Management and Rangeland Resources 2.) GE credit: SciEng | SE, SL.—W. (W.) Marrush, Zakharov

##### 5. Plants for Garden, Orchard and Landscape (2)

Lecture—1 hour; laboratory—3 hours. Prerequisite: for non-majors. Hands-on experience with plants cultivated for food, environmental enhancement and personal satisfaction. Topics include establishing a vegetable garden, pruning and propagation activities, growing flowers and ornamental plants, and the role of plants in human health and well-being. Not open for credit to students who have completed Plant Biology 1 or Plant Sciences 2. (Former course Plant Biology 1.) GE credit: SE.—F, S. (F, S.) Marrush

##### 6. Flower Power—Art and Science of Flowers and Their Uses (2)

Lecture/discussion—2 hours. Prerequisite: high school biology. Introduction to the art and science of using and growing flowers to harness the power that is represented by their aesthetic beauty. Handling, production, arranging, breeding and marketing of flowers. Emphasis on potted plants and cut-flowers. (P/NP grading only.)—S. (S.) Lieth

##### 12. Plants and Society (4)

Lecture—3 hours; extensive writing—3 hours. Prerequisite: high school biology. Dependence of human societies on plant and plant products. Plants as resources for food, fiber, health, enjoyment and environmental services. Sustainable uses of plants for food production, raw materials, bioenergy, and environmental conservation. Global population growth and future food supplies. Not open for credit

to students who have complete Plant Biology 12. (Former course Plant Biology 12.) [Same course as Science and Society 12.] GE credit: SciEng or SocSci, Div, Wrt | SE or SS, WE.—F, W, S. (F, W, S.) Drakakaki, Fischer, Jasieniuk, Tian

#### 14. Introduction to Current Topics in Plant Biology (4)

Discussion—3 hours; term paper. Introduction to scientific methods and current understanding of genetics, metabolism, and cellular structure in plants, with special emphasis on topics related to societal issues, such as herbal medicines and genetically modified organisms. Designed for students not specializing in biology. Not open for credit to students who have completed Plant Biology 11. GE credit: SciEng, Wrt | SE, SL.

#### 15. Introduction to Sustainable Agriculture (4)

Lecture—3 hours; laboratory—3 hours. Multidisciplinary introduction to agricultural sustainability with a natural sciences emphasis. Sustainability concepts and perspectives. Agricultural evolution, history, resources and functions. Diverse agricultural systems and practices and their relative sustainability. Laboratories provide direct experience with selected agricultural practices and systems. GE credit: SciEng | SE.—S. (S.) Van Horn, Williams

#### 21. Application of Computers in Technology (3)

Lecture—2 hours; laboratory/discussion—2 hours. Prerequisite: high school algebra. Concepts of computing and applications using personal computers, spreadsheets, database management, word processing and communications. Not open for students who have completed Agricultural Management and Rangeland Resources 21. (Former course Agricultural Management and Rangeland Resources 21.) GE credit: SciEng | SE, VL.—F, W, S. (F, W, S.) Frank

#### 49. Organic Crop Production Practices (3)

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Principles and practices of organic production of annual crops. Including organic crops, soil, and pest management, cover cropping, composting, seeding, transplanting, irrigation, harvesting and marketing. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 49. (Former course Agricultural Management and Rangeland Resources 49.) (P/NP grading only.) GE credit: SE.—F, S. (F, S.) Van Horn

#### 92. Internship (1-12)

Internship—3-36 hours. Prerequisite: consent of instructor. Work experience on or off campus in subject areas pertaining to plant and environmental sciences. Internship supervised by faculty member. May be repeated for credit. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

#### 98. Directed Group Study (1-5)

Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

#### 99. Special Study for Undergraduates (1-5)

Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

#### Upper Division

##### 100A. Metabolic Processes of Cultivated Plants (3)

Lecture—3 hours. Prerequisite: course 2 or Biological Sciences 1C or consent of instructor. Principles of energy capture and photosynthesis, water use, and nutrient cycling. Conversion of these resources into products (carbohydrates, proteins, lipids, and other chemicals) by plants. Emphasis on the relationships between environmental resources, plant metabolism and plant growth. GE credit: SciEng | SE.—F. (F.) Gilbert

##### 100AL. Metabolic Processes of Cultivated Plants Laboratory (2)

Laboratory/discussion—3 hours. Prerequisite: course 100A or the equivalent (may be taken concurrently). Techniques and instruments used to study plant metabolic processes, including water relations,

respiration, photosynthesis, enzyme kinetics, microscopy, immunochemistry, and nitrogen fixation. Quantitative methods, problem solving, and practical applications are emphasized. GE credit: SciEng | SE. —F. (F.) Blumwald, Drakakaki, Gilbert

### **100B. Growth and Yield of Cultivated Plants (3)**

Lecture—3 hours. Prerequisite: course 100A or consent of instructor. Principles of the cellular mechanisms and hormonal regulation underlying plant growth, development, and reproduction. Emphasis on how these processes contribute to the harvestable yield of cultivated plants and can be managed to increase crop productivity and quality. GE credit: SciEng | SE. —W. (W.) Bradford, Melotto

### **100BL. Growth and Yield of Cultivated Plants Laboratory (2)**

Laboratory/discussion—3 hours. Prerequisite: course 100B or equivalent (may be taken concurrently). Laboratory exercises in plant growth and development and their regulation, including photomorphogenesis, plant growth regulators, plant anatomy, seed germination, fruit ripening and senescence. Includes field trips to illustrate relationships to cropping and marketing systems. GE credit: SciEng | SE. —(W.) Bradford

### **100C. Environmental Interactions of Cultivated Plants (3)**

Lecture—3 hours. Prerequisite: course 100A or consent of instructor. Principles of plant interactions with their physical and biological environments and their acquisition of the resources needed for growth and reproduction. Emphasis on how management practices and environmental conditions affect crop productivity. GE credit: SciEng | SE. —S. (S.) Brown

### **100CL. Environmental Interactions of Cultivated Plants Laboratory (2)**

Laboratory/discussion—3 hours. Prerequisite: course 100C (may be taken concurrently). Techniques and instruments used to study plant interactions with their physical and biological environments, including light responses, transpiration, microclimatology, nutrient availability and utilization, biomass accumulation. Quantitative methods and modeling are emphasized. GE credit: SciEng | SE. —S. (S.) Shackel

### **101. Agriculture and the Environment (3)**

Lecture—3 hours. Prerequisite: course 2 or consent of instructor. Interaction between agriculture and the environment. Focus on the interaction between agriculture and the environment to address the principles required to analyze conflict and develop solutions to complex problems facing society. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 101. (Former course Agricultural Management and Rangeland Resources 101.) GE credit: SciEng | SE, SL. —W. (W.) Van Kessel

### **102. California Floristics (5)**

Lecture—3 hours; laboratory—8 hours. Prerequisite: course 2, Biological Sciences 1C, 2C, or equivalent course in Plant Science. Survey of the flora of California, emphasizing recognition of important vascular plant families and genera and use of taxonomic keys for species identification. Current understanding of relationships among families. Principles of plant taxonomy and phylogenetic systematics. One Saturday field trip. (Same course as Plant Biology 102.) GE credit: SciEng | SE, VL. —S. (S.) Potter

### **105. Concepts in Pest Management (3)**

Lecture—2 hours; laboratory/discussion—3 hours. Prerequisite: Biological Sciences 1C or course 2, Chemistry 8B. Introduction to the ecological principles of integrated pest management, biology of different classes of pests and the types of losses they cause, population assessment, evaluation of advantages and disadvantages of different techniques used for pest management, IPM programs. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 105. (Former course Agricultural Management and Rangeland Resources 105.) GE credit: SciEng | SE. —F. (F.) Al-Khatib

### **110A. Principles of Agronomic Crop Production in Temperate and Tropical Systems (3)**

Lecture—3 hours. Prerequisite: course in general botany or course 2 recommended. Fundamentals of field crop production in temperate and tropical climates. Resource utilization and economic, political and social problems are considered in relation to technological problems and their influences on agricultural development. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 110A. (Former course Agricultural Management and Rangeland Resources 110A.) —F. (F.) Mitchell

### **110C. Crop Management Systems for Vegetable Production (4)**

Lecture—2 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 2; course 110A recommended. Horticultural principles applied to production and management systems for vegetable crops. Laboratory and discussion will illustrate efficient field management and resource use practices. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 110C. (Former course Agricultural Management and Rangeland Resources 110C.) —F. Mitchell

### **110L. Principles of Agronomy Laboratory (1)**

Laboratory—3 hours. Prerequisite: course 110B (may be taken concurrently). Field-oriented introduction to principles of agronomic crop production. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 110L. (Former course Agricultural Management and Rangeland Resources 110L.) —F. (F.) Mitchell

### **112. Forage Crop Ecology (3)**

Lecture—3 hours. Prerequisite: course 2, Biological Sciences 1C, 2C, or consent of instructor. Forages as a world resource in food production. Ecological principles governing the adaptation, establishment, growth and management of perennial and annual forages, including pastures, rangelands and hay; aspects of forage quality which affect feeding value to livestock. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 112. (Former course Agricultural Management and Rangeland Resources 112.) GE credit: SciEng | SE. —W. (W.) Brummer

### **113. Biological Applications in Fruit Tree Management (2)**

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 2, Biological Sciences 1C, 2C or equivalent. Physiology, growth, development and environmental requirements of fruit trees and the cultural practices used to maintain them. Emphasis on the application of biological principles in the culture of commercially important temperate zone fruit tree species. Not open for credit to students that have completed Plant Biology 173. (Former course Plant Biology 173.) GE credit: SciEng | SE. —W. (W.) DeJong

### **114. Biological Applications in Fruit Production (2)**

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 2, Biological Sciences 1C or 2C; course 113. Reproductive biology of tree crop species. Biological principles of fruit production, tree nutrition and orchard management for optimizing cropping. Laboratories emphasize hands-on work with orchard tree systems that are done specifically to produce the crop. Not open for credit to students who have completed Plant Biology 174. (Former course Plant Biology 174.) GE credit: SciEng | SE. —S. (S.) DeJong

### **116. Plant Morphology and Evolution (5)**

Lecture—3 hours; laboratory—4 hours. Prerequisite: introductory plant biology (e.g., Biological Sciences 2C, Plant Sciences 2). Introduction to the form, development, and evolution of vascular plants. Emphasis given to the form and development of reproductive structures in ferns and seed-producing plants as a basis for determining evolutionary relationships. Not open for credit to students who have

completed Plant Biology 116. (Same course as Plant Biology 116.) GE credit: SciEng | SE, VL. —W. (W.) Jernstedt

### **120. Applied Statistics in Agricultural Science (4)**

Lecture—3 hours; discussion/laboratory—3 hours. Prerequisite: upper division standing. Application of statistical methods to design and analysis of research trials for plant, animal, behavioral, nutritional, and consumer sciences. Basic concepts and statistical methods are presented in lectures, laboratories emphasize data processing techniques, problem solving, and interpretation in specialized fields. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 120. (Former course Agricultural Management and Rangeland Resources 120.) GE credit: SciEng | QL. —F. (F.) Laca, Medrano

### **130. Rangelands: Ecology, Conservation and Restoration (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 1C; introductory ecology course and junior standing recommended. Introduction to the ecological principles and processes important for an understanding of the dynamics of range ecosystems. Emphasis on ecological and evolutionary concepts underlying management strategies for conserving biological diversity and environmental quality in rangelands. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 130. (Former course Agricultural Management and Rangeland Resources 130.) Offered in alternate years. GE credit: SE. —(W.) Tate

### **131. Identification and Ecology of Grasses (2)**

Lecture—7.5 hours; laboratory—20 hours; discussion—5 hours. Prerequisite: Biological Sciences 1C or course 2; Plant Biology 102 and junior standing recommended. Taxonomy and identification of western grasses. Development of skills in using plant identification keys. Ecology and evolution of grasses in grazing ecosystems. Given the week following spring quarter. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 131. (Former course Agricultural Management and Rangeland Resources 131.) Offered in alternate years. GE credit: SciEng | SE, VL. —S. DiTomaso

### **135. Ecology and Community Structure of Grassland and Savannah Herbivores (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 1A or 1B and course 2, or Biological Sciences 1C; general ecology course (Environmental Science and Policy 100) recommended. Feeding ecology of grassland herbivores and its importance in evolution of herbivore communities and social systems. Optimal foraging, interspecific interactions, and primary productivity are considered as factors structuring natural and managed grassland and savannah systems. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 135. (Former course Agricultural Management and Rangeland Resources 135.)

### **141. Ethnobotany (4)**

Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: course 2, Biological Sciences 1C or 2C. Relationships and interactions between plants and people, including human perceptions, management, and uses of plants, influences of plants on human cultures, and effects of human activity on plant ecology and evolution. Concepts, questions, methods, and ethical considerations in ethnobotanical research. Not open for credit to students who have completed Plant Biology 141. (Former course Plant Biology 141.) Offered in alternate years. GE credit: SciEng or SocSci, Wrt | OL, SE or SS, WE. —W. Potter

### **144. Trees and Forests (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Sciences 2 or Biological Sciences 1C or 2C. Biological structure and function of trees as organisms; understanding of forests as communities and as ecosystems; use of forests by humans; tree phenology, photosynthesis, respiration, soil processes, life

histories, dormancy, forest biodiversity, and agroforestry. (Same course as Environmental Science and Management 144.) Not open for credit to students who have completed Plant Biology 144 or Environmental Horticulture 144 or Environmental and Resource Science 144. (Former course Plant Biology/Environmental Horticulture/Environmental and Resource Science 144.) GE credit: SciEng | SE, VL, —F. (F.) Dahlgren, Latimer, Zwieniecki

#### **147. California Plant Communities (3)**

Lecture/discussion—3 hours. Prerequisite: course 2 or Biological Sciences 2C. Ecology, distribution, and species of California's plant communities. Environmental forces that determine these communities, the threats they face, and their conservation and restoration opportunities. Not open for credit to student who have completed Plant Biology 147. (Former course Plant Biology 147.) GE credit: SciEng | SE, VL, —S. (S.) Young

#### **147L. California Plant Communities Field Study (1)**

Discussion/laboratory—3 hours. Prerequisite: course 2 or Biological Sciences 2C, and concurrent or previous enrollment in course 147. Visits to many of northern California's plant communities, from the north coast to the Central Valley to the Sierras. Discussion of community ecology and hands-on identification of species. Two Saturday and two three-day field trips required. Not open for credit to students who have completed Plant Biology 147. (Former course Plant Biology 147.) GE credit: SciEng | SE, VL, —S. (S.) Young

#### **150. Sustainability and Agroecosystem Management (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Soil Science 10, Chemistry 2A, and Plant Sciences 2, Biological Sciences 1C or 2C. Interdisciplinary analysis of agricultural production and food systems with primary emphasis on biophysical processes. General concepts governing the functioning of temperate and tropical agroecosystems in relation to resource availability, ecological sustainability, and socio-economic viability. Comparative ecological analyses of agroecosystems. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 150. (Former course Agricultural Management and Rangeland Resources 150.) GE credit: SciEng | OL, SE, SL, —S. (S.) Gaudin

#### **152. Plant Genetics (4)**

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: Biological Sciences 1A or 2A or consent of instructor. Basic principles of transmission genetics, cytogenetics, population and quantitative genetics, and molecular genetics. Practical aspects of genetic crosses and analysis of segregating populations. Not open to students who have completed Plant Biology 152. (Former course Plant Biology 152.) GE credit: SciEng | SE, —F. (F.) Beckles

#### **153. Plant, Cell, Tissue and Organ Culture (4)**

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 2 or Biological Sciences 1C or 2C. Basic and applied aspects of plant tissue culture including media preparation, micropropagation, organogenesis, embryogenesis, anther culture, protoplast culture and transformation. Not open for credit to students who have completed Plant Biology 153. (Former course Plant Biology 153.) GE credit: SciEng | SE.

#### **154. Introduction to Plant Breeding (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 152, Biological Sciences 101 or consent of instructor. Principles, methods and applications of plant breeding and genetics to the improvement of crop plants. Illustration of how plant breeding is a dynamic, multidisciplinary, constantly-evolving science. Laboratory emphasizes hands-on experience in the basics of breeding through experiments. Not open for credit to students who have completed Plant Biology 154. (Former course Plant Biology 154.) GE credit: SciEng | SE, —W. (W.) St. Clair

#### **157. Physiology of Environmental Stresses in Plants (4)**

Lecture—2 hours; discussion—2 hours. Prerequisite: course 100C or Plant Biology 111 or 112 or Environmental Horticulture 102 or Viticulture and Enology 110. Stress concepts and principles; molecular, physiological, developmental and morphological characteristics enabling plants to avoid or tolerate environmental stresses; stress acclimation and adaptation processes; responses of wild and cultivated species to drought, flooding, nutrient deficiencies, salinity, toxic ions, extreme temperatures, etc. Not open for credit to students who have completed Plant Biology 157. (Former course Plant Biology 157.) GE credit: SciEng | SE.

#### **158. Mineral Nutrition of Plants (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100A or Plant Biology 111 or Environmental Horticulture 102 or Viticulture and Enology 110. Evolution and scope of plant nutrition; essential elements; mechanisms of absorption and membrane transporters; translocation and allocation processes; mineral metabolism; deficiencies and toxicities; genetic variation in plant nutrition; applications to management and understanding ecological effects of nutrient availability or deficiency. Not open for credit to students who have completed Plant Biology 158. (Former course Plant Biology 158.) Offered in alternate years. GE credit: SciEng | SE, —S. Brown

#### **160. Agroforestry: Global and Local Perspectives (3)**

Lecture/discussion—3 hours. Prerequisite: course 2 or Biological Sciences 1C or 2C; course 142 or 150 or Biological Sciences 2B or a general ecology course. Traditional and evolving use of trees in agricultural ecosystems; their multiple roles in environmental stabilization and production of food, fuel, and fiber; and socioeconomic barriers to the adoption and implementation of agroforestry practices. Not open for credit to students who have previously taken Agricultural Management and Rangeland Resources 160. (Former course Agricultural Management and Rangeland Resources 160.) Offered in alternate years. GE credit: SciEng | SE, —F. (F.) Gradziel

#### **162. Urban Ecology (3)**

Lecture/discussion—3 hours. Prerequisite: course in general or plant ecology (course 142, Plant Biology 117 Environmental Science and Policy 100, or Evolution and Ecology 101). Application of fundamental concepts and approaches in landscape and ecosystem ecology to urban ecosystems. Ecological and social drivers and responses. Landscape heterogeneity, nutrient dynamics, invasive species, altered hydrology and climate, and pollution. Discussion of primary literature. Discussion of primary literature. GE credit: SciEng | SE, SL, —W. (W.) Cadenasso

#### **163. Ecosystem and Landscape Ecology (4)**

Lecture/discussion—4 hours. Prerequisite: course in general, plant, or soil ecology; Evolution and Ecology 117, Plant Biology 117, Environmental Science and Policy 100, Evolution and Ecology 101, Soil Science 112. Integration of concepts to understand and manage ecosystems in a complex and changing world. Emphasis on interactions among biotic, abiotic and human factors and changes over space/time. Local to global controls over water, carbon and nutrients across ecosystems/landscapes. Not open for credit to students who have completed Ecology 201.—W. (W.) Cadenasso, Eviner

#### **164. Practicum in Ecological Restoration (1)**

Fieldwork—3 hours. Prerequisite: Environmental Horticulture 160 recommended. Hands-on field course that exposes students to various aspects of ecological restoration throughout the seasonal restoration cycle with real-world practitioners. Emphasis on grassland/rangeland, riparian, and oak woodland communities. May be repeated three times for credit. —F, W, S. (F, W, S.) Young

#### **170A. Fruit and Nut Cropping Systems (2)**

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 2, Biological Sciences 1C, or consent of instructor. Overview of production and handling systems of major pomological crops, analysis of current

cultural and harvesting problems and concerns associated with commercial fruit growing. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 170A. (Former course Agricultural Management and Rangeland Resources 170A.) Offered in alternate years. GE credit: SciEng | SE, —(F.) Gradziel

#### **170B. Fruit and Nut Cropping Systems (2)**

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 2, Biological Sciences 1C, or consent of instructor. Overview of production and handling systems of major pomological crops, including analysis of current cultural and harvesting problems and concerns associated with commercial fruit growing. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 170B. (Former course Agricultural Management and Rangeland Resources 170B.) Offered in alternate years. GE credit: SciEng | SE, —(S.) Gradziel

#### **171. Principles and Practices of Plant Propagation (4)**

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 2, Biological Sciences 1C or 2C. Principles and practices of propagating plants covering anatomical, physiological, and practical aspects. Not open for credit to students who have completed Plant Biology 171. (Former course Plant Biology 171.) GE credit: SciEng | SE, —S. (S.) Evans

#### **172. Postharvest Physiology and Technology (4)**

Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: general plant science background (e.g., courses 2, 12); course 196 recommended. Overview of physiological processes related to maturation and senescence of plant products and their responses to postharvest stresses. Targeted approaches and technologies to maintain product quality and limit postharvest disorders. Not open for credit to students who have completed Plant Biology 172. (Former course Plant Biology 172.) GE credit: SciEng | SE, —F. (F.) Saltveit

#### **173. Molecular and Cellular Aspects of Postharvest Biology (3)**

Lecture/discussion—3 hours. Prerequisite: course 2, Biological Sciences 1C, 2C or equivalent. Basic concepts and current knowledge of issues relevant to postharvest biology. Mechanisms of fruit ripening, senescence, programmed cell death. Metabolism and functions of phytohormones, carbohydrates, lipids, pigments, flavor compounds, and phytonutrients at molecular and cellular levels. Offered in alternate years. GE credit: SciEng | SE, —(S.) Zakharov

#### **174. Microbiology and Safety of Fresh Fruits and Vegetables (3)**

Lecture—3 hours. Prerequisite: course 2 or Biological Sciences 1C or 2C or equivalent. Overview of microorganisms on fresh produce, pre- and postharvest factors influencing risk of microbial contamination, attachment of microorganisms to produce, multiplication during postharvest handling and storage, and methods of detection. Mock outbreak trial and presentation of science-based forensic discovery. GE credit: SciEng | SE, —F. (F.) Melotto

#### **176. Introduction to Weed Science (4)**

Lecture—2 hours; laboratory/discussion—4 hours. Prerequisite: course 2 or Biological Sciences 1C or 2C. Weed biology and ecology, methods of weed management, biological control, herbicides and herbicide resistance. Weed control in managed and natural ecosystems; invasive species. Laws and regulations. Application of herbicides. Sight and soft-ware-assisted identification of common weeds. Not open for credit to students who have completed Plant Biology 176. (Former course Plant Biology 176.) GE credit: SciEng | VL, SE, —W. (W.) Al-Khatib, DiTomaso

#### **178. Biology and Management of Aquatic Plants (3)**

Lecture—3 hours. Prerequisite: course 2, Biological Sciences 1C or 2C; Chemistry 8B or 118B; course 100C, Plant Biology 111, Environmental Horticulture 102, or Hydrologic Science 122 recom-

mended. Brief survey of common and invasive fresh water plants and macroalgae, their reproductive modes, physiology, growth (photosynthesis, nutrient utilization), development (hormonal interactions), ecology, modes and impacts of invasion, and management. Two Saturday field trips required. Not open for credit to students who have completed former course Plant Biology 178. (Former course Plant Biology 178.) Offered in alternate years. GE credit: SciEng | SE. —F. Anderson

### **188. Undergraduate Research Proposal (3)**

Lecture/discussion—3 hours. Prerequisite: upper division standing. Preparation and review of a scientific proposal. Problem definition, identification of objectives, literature survey, hypothesis generation, design of experiments, data analysis planning, proposal outline and preparation. (Same course as Biotechnology 188.) GE credit: SciEng, Wrt | OL, SE, WE. —S. (S.) Kliebenstein

### **189L. Laboratory Research in Plant Sciences (2-5)**

Laboratory—3-12 hours; discussion—1 hour. Prerequisite: course 188 and consent of instructor. Formulating experimental approaches to current questions in Plant Sciences; performance of proposed experiments. May be repeated up to 12 units for credit. (P/NP grading only.) —F, W, S. (F, W, S.)

### **190. Seminar on Alternatives in Agriculture (2)**

Seminar—1 hour; discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Seminar on topics related to alternative theories, practices and systems of agriculture and the relationship of agriculture to the environment and society. Scientific, technological, social, political and economic perspectives. May be repeated for two times for credit for a total of three times. GE credit: SciEng | SE. —W. (W.) Van Horn

### **190C. Research Group Conference (1)**

Discussion—1 hour. Prerequisite: advanced standing; consent of instructor. Weekly conference on research problems, progress and techniques in the plant sciences. May be repeated for credit. (P/NP grading only.) —F, W, S. (F, W, S.)

### **192. Internship (1-12)**

Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience on or off campus in subject areas pertaining to plant and environmental sciences. Internship supervised by a faculty member. (P/NP grading only.) —F, W, S, Su. (F, W, S, Su.)

### **193. Garden and Farm-Based Experiential Education Methods (2)**

Lecture—1 hour; laboratory—3 hours. Prerequisite: upper division standing or consent of instructor. Methods of teaching children and youth about fruit and vegetable production and consumption. Lesson and activity planning for garden and farm field trips. Basic biology, ecology, plant science, and crop management practices. Mentorship in experiential learning. Preparation of garden site. (P/NP grading only.) GE credit: SciEng | OL, SE. —W. (W.) Van Horn

### **194H. Senior Honors Thesis (1-2)**

Independent study—3-6 hours. Prerequisite: senior standing; overall GPA of 3.250 or higher and consent of master adviser. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis. (P/NP grading only.) GE credit: SE, WE. —F, W, S, Su. (F, W, S, Su.)

### **196. Postharvest Technology of Horticultural Crops (3)**

Lecture/discussion—45 hours; fieldwork—45 hours. Prerequisite: upper division or graduate student standing. Intensive study of postharvest considerations and current procedures and challenges in postharvest handling for fruits, nuts, vegetables, and ornamentals in California. Scheduled first two weeks immediately following last day of spring quarter. Not open for credit to students who have completed Plant Biology 196. (Former course Plant Biology 196.) (P/NP grading only.) GE credit: SE. —S. (S.) Mitcham

### **197T. Tutoring in Plant Sciences (1-5)**

Tutorial—1-5 hours. Prerequisite: upper division standing, completion of course being tutored or the equivalent; consent of instructor. Leading small voluntary discussion or lab groups affiliated with one of the department's regular courses. May be repeated for up to eight units of credit. (P/NP grading only.) —F, W, S, Su. (F, W, S, Su.)

### **198. Directed Group Study (1-5)**

(P/NP grading only.) —F, W, S, Su. (F, W, S, Su.)

### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) —F, W, S, Su. (F, W, S, Su.)

### **Graduate**

### **205. Experimental Design and Analysis (5)**

Lecture—3 hours; discussion/laboratory—2 hours. Prerequisite: course 120 or equivalent. Introduction to the research process and statistical methods to plan, conduct and interpret experiments. Not open for credit to students who have completed Agronomy 205. (Former course Agronomy 205.) —W. (W.) Dubcovsky, Runcie

### **206. Applied Multivariate Modeling in Agricultural and Environmental Sciences (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: one of course 120, Statistics 106, 108, course 205 or equivalent. Multivariate linear and nonlinear models. Model selection and parameter estimation. Analysis of manipulative and observational agroecological experiments. Discriminant, principal component, and path analyses. Logistic and biased regression. Bootstrapping. Exercises based on actual research by UC Davis students. Not open for credit to students who have completed Agronomy 206. (Former course Agronomy 206.) —F. (F.) Laca

### **212. Postharvest Biology and Biotechnology of Fruits and Nuts (3)**

Lecture—3 hours. Prerequisite: course 172. Review of postharvest biology of fruits and nuts and biotechnological approaches to address postharvest challenges. Morphology, biology and postharvest handling of fruits and nuts are presented along with current research, including biotechnology, and discussion of future research needs and approaches. Not open for credit to students who have completed Pomology 212. Offered in alternate years. —S. (S.) Crisosto, Mitcham, Zakharov

### **213. Postharvest Physiology of Vegetables (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: course 172 or course 100B or Plant Biology 112. Comparative physiology of harvest vegetables; emphasis on maturation, senescence, compositional changes, physiological disorders and effects of environmental factors. Concepts and research procedures. Not open for credit to students who have completed Vegetable Crops 212. (Former course Vegetable Crops 212.) Offered in alternate years. —(S.) Saltveit

### **220. Genomics and Biotechnology of Plant Improvement (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 101 or the equivalent. Integration of modern biotechnology and classical plant breeding including the impact of structural, comparative and functional genomics on gene discovery, characterization and exploitation. Also covers molecular markers, plant transformation, hybrid production, disease resistance, and novel output traits. Not open for credit to students who have completed Vegetable Crops 220. (Former course Vegetable Crops 220.) (Same course as Genetics 220.)

### **221. Genomics and Breeding of Vegetable Crops (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 101 or equivalent. Preview of genome structure, mapping, gene tagging and development of other genetic resources applied to improvement of major vegetables. For graduate students contemplating a career in modern vegetable breeding and biotech-

nology. Not open for credit to students who have completed Vegetable Crops 221. (Former course Vegetable Crops 221.)

### **222. Advanced Plant Breeding (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 154 and 205; Genetics 201D or Animal Genetics 107 recommended. Philosophy, methods, and problems in developing improved plant species. Topics include: inbreeding, heterosis, progeny testing, breeding methodology, index selection, germplasm conservation, and breeding for stress resistance. Laboratories include tours of breeding facilities and calculation and interpretation of quantitative data. —S. (S.) Brummer

### **230. Forest Biology (4)**

Lecture—3 hours; seminar—1 hour. Prerequisite: graduate standing or advanced undergraduate with consent of instructor. Cross-disciplinary review of forest biology, including physiology, genetics, pathology, ecology, and silviculture. —S. (S.) Neale, North, Richards, Rizzo, Schwartz

### **290. Seminar (1-2)**

Seminar—1-2 hours. Topics of current interest related to Plant Sciences. (S/U grading only.) —F, W, S. (F, W, S.)

### **290C. Research Conference (1)**

Discussion—1 hour. Prerequisite: consent of instructor. (S/U grading only.) —F, W, S. (F, W, S.)

### **297T. Tutoring in Plant Science (1-5)**

Tutoring—1-5 hours. Prerequisite: graduate standing; consent of instructor; completion of course to be tutored or the equivalent. Designed for graduate students who desire teaching experience but are not teaching assistants. May be repeated for credit for a total of five units. Same course may not be tutored more than once. (S/U grading only.)

### **298. Group Study (1-5)**

### **299. Research (1-12)**

Prerequisite: consent of instructor. (S/U grading only.) —F, W, S, Su. (F, W, S, Su.)

### **Professional**

### **396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: consent of instructor; graduate standing. (S/U grading only.) —F, W, S, Su. (F, W, S, Su.)

## **Plastic Surgery**

See Medicine, School of, on page 427.

## **Political Science**

(College of Letters and Science)

John T. Scott, Ph.D., Interim Chairperson of the Department

**Department Office.** 469 Kerr Hall  
530-752-0966

**Political Science Undergraduate Student Matters.** 468 Kerr Hall  
530-752-6241

**International Relations Undergraduate Student Matters.** 464 Kerr Hall  
530-754-8098

**Graduate Student Matters.** 472 Kerr Hall  
530-752-0969

<http://ps.ucdavis.edu>

### **Faculty**

James F. Adams, Ph.D., Professor  
Josephine T. Andrews, Ph.D., Associate Professor  
Cheryl L. Boudreau, Ph.D., Associate Professor  
Amber Boydston, Ph.D., Associate Professor  
Erik Engstrom, Ph.D., Professor  
Omar García-Ponce, Ph.D., Assistant Professor  
Christopher Hare, Ph.D., Assistant Professor

**Fall 2011 and on Revised General Education (GE): AH=Arts and Humanities; SE=Science and Engineering; SS=Social Sciences;**

**ACGH=American Cultures; DD=Domestic Diversity; OL=Oral Skills; QL=Quantitative; SL=Scientific; VL=Visual; WC=World Cultures; WE=Writing Experience**

**Pre-Fall 2011 General Education (GE): ArtHum=Arts and Humanities; SciEng=Science and Engineering; SocSci=Social Sciences; Div=Domestic Diversity; Wrt=Writing Experience**  
**Quarter Offered:** F=Fall, W=Winter, S=Spring, Su=Summer; 2017-2018 offering in parentheses

Benjamin Highton, Ph.D., Professor
Adrienne Hosek, Ph.D., Assistant Professor
Ryan Hubert, Ph.D., Assistant Professor
Robert Huckfeldt, Ph.D., Distinguished Professor
Bradford S. Jones, Ph.D., Professor
Brandon Kinne, Ph.D., Assistant Professor
Daniel Y. Kono, Ph.D., Associate Professor
Scott MacKenzie, Ph.D., Assistant Professor
Zeev Maoz, Ph.D., Distinguished Professor
Heather McKibbens, Ph.D., Assistant Professor
Jeannette Money, Ph.D., Associate Professor
Gabriella R. Montinola, Ph.D., Associate Professor
Miroslav Nincic, Ph.D., Professor
Lauren Peritz, Ph.D., Assistant Professor
Lindsay Reid, Ph.D., Assistant Professor
Shalini Sankaranandan, Ph.D., Assistant Professor
Ethan Scheiner, Ph.D., Professor
John T. Scott, Ph.D., Professor
Matthew S. Shugart, Ph.D., Professor
Walter J. Stone, Ph.D., Professor
Robert S. Taylor, Ph.D., Associate Professor

### Emeriti Faculty

Larry Berman, Ph.D., Professor Emeritus
Edmond Costantini, Ph.D., Professor Emeritus
John B. Gates, Ph.D., Lecturer
Alexander J. Groth, Ph.D., Professor Emeritus
Stuart L. Hill, Ph.D., Lecturer
John R. Owens, Ph.D., Professor Emeritus
Randolph M. Siverson, Ph.D., Research Professor and Professor Emeritus
Larry L. Wade, Ph.D., Professor Emeritus
Geoffrey A. Wandesforde-Smith, Ph.D., Professor Emeritus

## The Political Science Major Program

Political science is the study of politics and political systems at the local, national, and international levels. It concerns not only the institutions of government but also the analysis of such phenomena as political behavior, political values, political change and stability, parties, pressure groups, bureaucracies, administrative behavior, justice, national security, and international affairs.

**The Program.** The Department of Political Science offers two major programs: political science and political science-public service. The political science major aims to provide the student with a broad understanding of political concepts, political institutions, political behavior, and political processes. The political science-public service major is for students who desire opportunities for practical hands-on experience in their major. It differs in particular from the political science major in its internship requirement and its focus on the American political system.

**Internships and Career Alternatives.** Both the proximity of UC Davis to the state capitol and the programs offered by the UC Center Sacramento and the UC Washington Center afford exceptional internship possibilities in local, state, and national government offices, providing students with actual experience in politics and government service while still attending school. A student who majors in political science acquires research and analytic skills relevant to many professional fields. Consequently, the majors offered in political science are valuable not only in providing students with a better understanding of politics and political systems, but also as a first step toward careers in teaching, law, management, government, urban planning, journalism, politics, administration, or for graduate studies in numerous fields.

## Political Science

### A.B. Major Requirements:

UNITS
Preparatory Subject Matter.....20
Four lower division Political Science courses from: 1, 2, 3, 4, 5 .....16
Political Science 51 (required course) .....4
Statistics 13 or 32 .....4

### Depth Subject Matter .....44-45

Four courses in one of the fields of concentration listed below .....16
Three courses in another field of concentration listed below .....12
Two courses in another field of concentration listed below .....8
Two other upper division courses in Political Science. Only five units of Political Science 192 may be counted toward the depth subject matter. .....8-9

### Fields of Concentration

<i>American Politics (courses with Political Science 1 are recommended): Political Science 126, 140A-140E, 142A-142C, 143A-143B, 144A-144B, 146A-146B, 147A-147D, 148A-148C, 179, 196B.</i>
<i>Comparative Politics (courses with Political Science 2 are recommended): Political Science 126, 140A-140E, 142A-142B, 143A-143B, 144A-144B, 146A-146B, 147A-147D, 148A-148C, 179, 196B.</i>
<i>International Relations (course with Political Science 3 are recommended): Political Science 120-124, 126, 129, 130-132, 134-137, 139, 190, 196C, International Relations 131.</i>
<i>Political Theory (courses with Political Science 4 as a prerequisite): Political Science 110, 112-117, 118A-118C, 119, 187, 196D</i>

### Total Units for the Major .....64-65

## Political Science—Public Service

### A.B. Major Requirements:

UNITS
Preparatory Subject Matter.....24

Political Science 1 .....4
Three courses from: Political Science 2, 3, 4, 5 or 7 .....12
Statistics 13 (or equivalent) .....4
Political Science 51 (required course) .....4

### Depth Subject Matter .....44-46

Core program .....12
Three courses chosen from Political Science 100, 102, 104, 105, 106, 108, 109, 113, 114, 180.
Internship, Political Science 192A, 192B, or 192W .....6
Research paper, Political Science 193 .....2-4
Fields of concentration .....24
Select six upper division courses from two or three fields of concentration listed below with at least two courses in each field selected; at least 16 of the units must be in political science; Core Program courses may not be counted toward this requirement.

### Fields of Concentration

<i>Field (1) Policy Process: Political Science 100, 102, 104, 105, 106, 108, 109, 140A, 160, 162, 163, 164, 165, 166, 168, 170, 171, 172, 174, 175, 180, 183, 187, 195; Economics 130, 131</i>
<i>Field (2) Policy Interpretation (public/pre-law): Political Science 119, 150, 151, 152, 153, 155</i>
<i>Field (3) State &amp; Local Policy: Political Science 100, 102, 104; Environmental Science and Policy 173; Sociology 143A</i>
<i>Field (4) Foreign Policy: Political Science 122, 130, 131, 132, 134, 139</i>
<i>Field (5) Environmental Policy: Political Science 107; Environmental Science and Policy 160, 161, 162, 166, 168A, 168B, 169, 171, 172, 173, 179</i>

<i>Field (6) Economic Policy: Economics 100, 130, 131, 151A, 151B</i>
<i>Field (7) Social Policy: Sociology 104, 124, 141, 150, 151, 154, 155, 175, 181</i>
<i>Field (8) Policy Analysis Tools: Economics 102, 140; Political Science 114</i>
<i>Field (9) Political Science 194HA, 194HB</i>

### Total Units for the Major .....68-70

**Major Advisers.** Consult Department office.

### Minor Program Requirements:

UNITS

### Political Science .....24

Six upper division Political Science courses.

**Public Affairs Internship Program.** This program is open to upper division students in any major who want to obtain an internship in the area of government and public service. Information and applications are available from the Political Science Department in 467 Kerr Hall.

**Graduate Study.** The Department of Political Science offers a program of graduate study and research leading to a Ph.D. degree or an M.A./J.D. joint degree. The M.A./J.D. joint degree is done only in conjunction with UC Davis School of Law. Information concerning admission to these programs and requirements for completion are available in the Graduate Program Coordinator office.

**Graduate Adviser.** Consult Graduate Program Coordinator office.

**American History and Institutions.** This University requirement may be satisfied by passing any one of the following Political Science courses: 1, 5, 100, 102, 104, 105, 106, 108, 109, 113, 130, 131, 160, 163; see also under University requirements.

## The International Relations Major Program

Ethan Scheiner, Ph.D., Program Director

**Program Office.** 464 Kerr Hall 530-754-8098

Problems of security, development, ethnic conflict, human rights, health, and the environment are increasingly confronted at a global rather than a national level. With its theoretical models and real-world application, the study of international relations is an exciting and highly relevant interdisciplinary major.

**The Program.** Graduation with a major in international relations requires completion of introductory courses in political science, economics, statistics, and history. The major also requires fluency in English and a working knowledge (approximately 24 to 30 units of course credits or equivalent fluency) of one other modern language. Students choose one of four tracks that encompass major topical areas in combination with an area studies emphasis:

- (1) World Trade and Development;
- (2) Peace and Security;
- (3) Global Environment, Health, and Natural Resources;
- (4) Peoples and Nationalities. Upper division course work for Tracks I, II and III is composed of twelve courses. Students choosing Track IV, Peoples and Nationalities, are required to study or work abroad for a minimum of one quarter; upper division course work is reduced to nine classes in recognition of the experience gained through education abroad.

**Programs, Internships, and Career Alternatives.** One program of special interest to international relations majors is the Education Abroad Program, which provides insights into the life and culture of other countries. At UC Davis, the Internship and Career Center assists students in obtaining legislative, legal, and business internships. In addition, the UC Davis Washington Center and UC Center Sacramento arrange internships and run full-credit academic program in Washington, D.C. and Sacramento respectively with a full range of opportunities for International Relations majors (see also UC Washington Center (UCDC), on page 576). International relations graduates are prepared for employment in government agencies (such as the Foreign Service), state agencies, international or non-governmental organizations (such as the United Nations),



163, Spanish 149, 151N, 153, 154, 155, 156, 157, 158, 160, 170, 172

#### Russian and East/Central Europe

*History:* History 138B, 138C, 143

*Social Analysis:* Political Science 144A, 144B

*Culture and Literature:* Russian 123, 124, 129, 130, 133, 150

#### Western Europe

*History:* History 140, 141, 142A, 144B,

145, 146A, 146B, 147B, 147C, 151D

*Social Analysis:* African American and African Studies 107C, Community and Regional Development 153B, Political

Science 137, 147A, 147B, 147C, 147D, 161

*Culture and Literature:* Studies 121, 176A,

176B, French 108, 120, 121, 133,

German 112, 114, 115, 117, 118B,

118C, 118E, 120, 126, 129, 141, 142,

143, 168, 185, Italian 107, 108, 120A,

120B, Spanish 137N, 138N, 139, 140N,

141, 142, 148, 157, 170

**Total units for the major ..... 64-102**

**Major Adviser.** Daniel Kono (*Political Science*)

### Courses in International Relations (IRE)

#### Lower Division

##### 1. Global Interdependence (4)

Lecture—3 hours; discussion—1 hour. Development of the concept of global interdependence along its political, economic, demographic, cultural, technological, and environmental dimensions. Focus on the ways societies and states interact. Course provides the foundation for upper division multidisciplinary work in international relations. GE credit: SocSci | SS, WE. –W. (W.)

##### 98. Directed Group Study (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

##### 99. Special Study for Undergraduates (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

#### Upper Division

##### 104. California State Government and Politics (4)

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: Sociology 1, 2, 3, or 4 recommended. The California political system. Political culture, constitution, elections and parties, direct democracy, legislature, governor, executive branch, courts, finances, state-local relations and policy issues. Offered irregularly. GE credit: SocSci, Wrt | ACGH, SS, WE.

##### 190. Topics in International Relations (4)

Lecture/discussion—4 hours. Prerequisite: consent of instructor. Selected topics in international relations. Variable content. May be repeated for credit when topic differs. GE credit: WE.

##### 192. International Relations Internship (1-12)

Internship—3-36 hours (to be arranged). Prerequisite: upper division standing and consent of instructor. Work experience in international relations, with term paper summarizing the practical experience of the student. (P/NP grading only.) GE credit: SS, WE.

##### 194HA-194HB. Special Study for Honors Students (4-4)

Seminar—2 hours; term paper. Prerequisite: open only to majors of senior standing who qualify for honors program. Directed reading, research, and writing on topics selected by students and instructor culminating in preparation of a senior honors thesis under direction of faculty adviser. (Deferred grading only, pending completion of sequence.) GE credit: SocSci | OL, SS, WE. –F, S. (F, S.)

##### 198. Directed Group Study (1-5)

Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

##### 199. Special Study for Advanced Undergraduates (1-5)

Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

### Courses in Political Science (POL)

#### Lower Division

##### 1. American National Government (4)

Lecture—3 hours; discussion—1 hour. Survey of American national government, including the constitutional system, political culture, parties, elections, the presidency, Congress, and the courts. GE credit: SocSci, Wrt | ACGH, SS, WE.

##### 2. Introduction to Comparative Politics (4)

Lecture—3 hours; discussion—1 hour. Introduction to basic concepts in political analysis and application of them in comparative studies of selected countries. Coverage is given to cultural and other informal dimensions of politics as well as to more formal political and governmental structures. GE credit: SocSci, Wrt | SS, WC, WE.

##### 3. International Relations (4)

Lecture—3 hours; discussion—1 hour. International conflict and cooperation, including the Cold War, nuclear weapons, and new techniques for understanding international politics. GE credit: SocSci, SocSci, Wrt | SS, WC, WE.

##### 4. Basic Concepts in Political Theory (4)

Lecture—3 hours; discussion—1 hour. Analysis of such concepts as the individual, community, liberty, equality, justice, and natural law as developed in the works of the major political philosophers. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

##### 5. Contemporary Problems of the American Political System (4)

Lecture—3 hours; discussion—1 hour. In-depth treatment of selected problems and issues of American politics, governmental institutions, and policies. GE credit: SocSci, Wrt | ACGH, SS, WE.

##### 7. Contemporary Issues in Law and Politics (4)

Seminar—4 hours. Limited enrollment; open to students having no more than 40.1 units. Seminar focusing on the political dimensions of American law and institutions. Examines the role of courts in resolving contemporary issues of law and politics including abortion, capital punishment, and civil rights. Offered irregularly. GE credit: SocSci, Wrt | ACGH, SS, WE.

##### 12Y. Data Visualization in the Social Sciences (4)

Lecture—2 hours; laboratory—1.5 hours; web virtual lecture—1.5 hours. Introduction to quantitative data across the social sciences (Communications, Political Science, Psychology, Sociology, and other disciplines). Transforming data, describing data, producing graphs, visual reasoning, and interpretations. (Same course as Communications 12Y, Sociology 12Y, Psychology 12Y.) GE credit: QL, VL—F, W, S. (F, W, S.) Cross

##### 51. Scientific Study of Politics (4)

Lecture—3 hours; discussion—1 hour. Introduction to the basic principles of the scientific study of politics. Research design and empirical analysis of data with applications to different methodological approaches and different substantive areas in political science. GE credit: ArtHum or SocSci | AH or SS, QL, SE, VL, WE.

##### 90X. Lower Division Seminar (4)

Seminar—4 hours. Prerequisite: lower division standing and consent of instructor. Limited enrollment. Examines fundamental issues and concepts that shape the study and practice of politics. Students will read, discuss and write about some of the most significant texts in political science in order to develop a foundation for the study of politics.

##### 99. Special Study for Undergraduates (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

#### Upper Division

##### 100. Local Government and Politics (4)

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended. Politics and government of local communities in the United States, including cities, counties and special districts. Emphasizes sources and varieties of community conflict, legislative and executive patterns, expertise, decision making and the politics of structure. Observation of local governing boards. Offered irregularly. GE credit: SocSci, Wrt | ACGH, SS, WE.

##### 102. Urban Public Policy (4)

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended; consent of instructor. Political and economic relationships among central cities, suburbs, and regional, state, and federal governments. Focuses upon policy areas such as poverty, transportation, welfare, and housing, and upon who governs and who benefits from the policies in these areas. Offered irregularly. GE credit: SocSci, Wrt | ACGH, DD, QL, SS, WE.

##### 104. California State Government and Politics (4)

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended; consent of instructor. The California political system. Political culture, constitution, elections and parties, direct democracy, legislature, governor, executive branch, courts, finances, state-local relations and policy issues. Offered irregularly. GE credit: SocSci, Wrt | ACGH, SS, WE.

##### 105. The Legislative Process (4)

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended. The legislative process with emphasis on the United States Congress; legislative organization and procedures, legislative leadership and policy making, legislators and constituents, relations between Congress and other agencies. Offered irregularly. GE credit: SocSci, Wrt | ACGH, SS, WE.

##### 106. The Presidency (4)

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended. The American presidencies origins and development; presidential power and influence as manifest in relationships with Congress, courts, parties, and the public in the formulation and administration of foreign and domestic policy; nominations, campaigns, and elections. Offered irregularly. GE credit: SocSci, Wrt | ACGH, SS, WE.

##### 107. Environmental Politics and Administration (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 recommended. Introduction to the environment as a political issue in the United States and to the development of administrative mechanisms for handling environmental problems. Changing role of Congress, the presidency, the bureaucracy, and the courts in environmental policy formulation and implementation. Offered irregularly. GE credit: SocSci, Wrt | ACGH, QL, SS, WE.

##### 108. Policy Making in the Public Sector (4)

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended; consent of instructor. Theoretical rationale for governmental activity, program evaluation, PPBS, positive theories of policy making, the quantitative study of policy determinants, implementation, and proposals for improved decision making. GE credit: SocSci, Wrt | ACGH, QL, SS, WE.

##### 109. Public Policy and the Governmental Process (4)

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended. The processes of formulating public policy, including individual and collective decision making, political exchange, competition, bargaining, coalition formation and the allocation of public goods, resources and opportunities. Offered irregularly. GE credit: SocSci, Wrt | ACGH, QL, SS, WE.

**110. The Strategy of Politics (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended. Introduction to game theory. Explanation of the behavior of individuals in strategic interaction. Rational and behavioral approaches. Applications to political science and other fields. Offered irregularly. GE credit: SocSci, Wrt | QL, SS, WE.

**112. Contemporary Democratic Theory (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 4 recommended. Major contemporary attempts to reformulate traditional democratic theory, attempts to replace traditional theory by conceptual models derived from modern social science findings. Offered irregularly. GE credit: ArtHum or SocSci, Wrt | AH or SS, WE.

**113. American Political Thought (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 4 recommended. Origins and nature of American political thought. Principles of American thought as they emerge from the founding period to the present. Offered irregularly. GE credit: ArtHum or SocSci, Wrt | ACGH, AH or SS, WE.

**114. Quantitative Analysis of Political Data (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 51 recommended. Logic and methods of analyzing quantitative political data. Topics covered include central tendency, probability, correlation, and non-parametric statistics. Particular emphasis will be placed on understanding the use of statistics in political science research. Offered irregularly. GE credit: ArtHum or SocSci, Wrt | AH or SS or SE, QL, VL, WE.

**115. Medieval Political Thought (4)**

Lecture—3 hours; term paper. Prerequisite: course 4 recommended. Examination of the ideas central to medieval political thinking. Emphasis will be upon the thoughts of the major political thinkers of the period, rather than upon political history. Offered irregularly. GE credit: ArtHum or SocSci, Wrt | AH or SS, WE.

**116. Foundations of Political Thought (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 4 recommended. Analysis and evaluation of the seminal works of a major political philosopher or of a major problem in political philosophy. May be repeated one time for credit when topic differs. Offered irregularly. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

**117. Topics in the History of Political Thought (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 4 recommended. The political thought of a specific historical period. Topics may include: Ancient Athens, the Italian Renaissance, the Enlightenment, or Nineteenth Century Germany. May be repeated once for credit. Offered irregularly. GE credit: SocSci, Wrt | SS, WE.

**118A. History of Political Theory: Ancient (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 4 recommended. Critical analyses of classical and medieval political philosophers such as Plato, Aristotle, Cicero and St. Thomas. Offered irregularly. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

**118B. History of Political Theory: Early Modern (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 4 recommended. Critical analyses of the works of late modern political philosophers such as Rousseau, Kant, Hegel, Tocqueville, Mill, Marx and Nietzsche. Offered irregularly. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

**118C. History of Political Theory: Late Modern (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 4 recommended. Critical analyses of the works of late modern political philoso-

phers such as Rousseau, Kant, Hegel, Tocqueville, Mill, Marx and Nietzsche. Offered irregularly. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

**119. Contemporary Political Thought (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 4 recommended. Contemporary political thought from the end of the nineteenth century to the present. Emphasis upon an individual philosopher, concept, or philosophical movement; e.g., Nietzsche, Continental political thought, Rawls and critics, theories of distributive justice, feminist theory. Offered irregularly. GE credit: ArtHum or SocSci, Wrt | AH or SS, WC, WE.

**120. Theories of International Politics (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 3 recommended; consent of instructor. Major contemporary approaches to the study of international politics, including balance of power, game theory, Marxist-Leninist theory, systems theory, and decision-making analysis. Offered irregularly. GE credit: SocSci, Wrt | SS, WE.

**121. Scientific Study of War (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 3 recommended. An analysis of political processes involved in the initiation, conduct and termination of modern interstate warfare. Offered irregularly. GE credit: SocSci, Wrt | QL, SS, WE.

**122. International Law (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 3 recommended. Selected topics in international law; territory, sovereign immunity, responsibility, the peaceful settlement or nonsettlement of international disputes. Offered irregularly. GE credit: SocSci, Wrt | SS, WE.

**123. The Politics of Interdependence (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 3 recommended; consent of instructor. In the past several decades, growing economic interdependence has generated new problems in international relations. Course deals with difficulties in managing complex interdependence and its implication on national policies and politics. Offered irregularly. GE credit: SocSci, Wrt | SS, WE.

**124. The Politics of Global Inequality (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 3 recommended. Analysis of current economic and political international relations resulting from a long standing division of the global system into rich and poor regions. Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WC, WE.

**126. Ethnic Self-Determination and International Conflict (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 3 recommended. Compares the claims of the state and ethnic peoples in countries undergoing internal conflicts; e.g., South Africa, Northern Ireland. Analyzes the role of the international community in facilitating the peaceful resolution of conflicts. Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WC, WE.

**129. Special Studies in International Politics (4)**

Lecture—3 hours; term paper. Prerequisite: course 3 recommended. Intensive examination of one or more special problems in international politics. May be repeated one time for credit when different topic is studied. Offered irregularly. GE credit: SocSci, Wrt | SS, WE. —W.

**130. Recent U.S. Foreign Policy (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 3 recommended; consent of instructor. Broad survey of the development of U.S. foreign policy in twentieth century with emphasis on transformation of policy during and after World War II, and the introduction to analytic tools and concepts useful for understanding of current foreign policy issues. Offered irregularly. GE credit: SocSci, Wrt | ACGH, SS, WE.

**131. Analysis of U.S. Foreign Policy (4)**

Lecture—3 hours; term paper. Prerequisite: course 3 recommended; consent of instructor. Detailed presentation and examination of the formulation of execution of U.S. foreign policy. Survey of numerous factors influencing policy outcomes and how such determinants vary according to policy issue areas. Offered irregularly. GE credit: SocSci, Wrt | SS, WE.

**132. National Security Policy (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 3 recommended. Development of national security policies since 1945. Analysis of deterrence and assumptions upon which it is based. Effects of nuclear weapons upon conduct of war, alliance systems, and the international system. Prospects of security and stability through arms control. Offered irregularly. GE credit: SocSci, Wrt | SS, WE.

**134. Africa and U.S. Foreign Policy (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 recommended; consent of instructor. Overview of American foreign policy toward Africa. Relationship to global adversaries. Legacies of colonialism. Challenge of national self-determination and white racism. Policies on non-alignment, producer cartels, multinational corporations, continental integration and trade and aid relations. Offered irregularly.

**135. International Politics of the Middle East (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 3 recommended; consent of instructor. Restricted to upper division standing. International politics of the Middle East as a microcosm of world politics. The Middle East as a regional system. Domestic and International Politics in the Middle East. Changing Political Structures in the Middle East. Superpower involvement in the Middle East. Offered irregularly. GE credit: SocSci, Wrt | SS, WE.

**136. The Arab-Israeli Conflict (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 3 recommended. Causes, course, and implications of Arab-Israeli conflict. Competing Israeli and Arab narratives, politics of force, diplomacy. Domestic politics and A-I conflict, the superpowers and the A-I conflict, A-I conflict and world politics, potential solutions. Offered irregularly. GE credit: SocSci, Wrt | SS, WE.

**137. International Relations in Western Europe (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 3 recommended. Analysis of European unity, problems of the Atlantic alliance, Atlantic political economy, East-West relations, communism in Western Europe and the relationship between domestic politics and foreign policy. Offered irregularly. GE credit: SocSci, Wrt | SS, WC, WE.

**139. Special Studies in Foreign Policy (4)**

Lecture—3 hours; term paper. Prerequisite: course 3 recommended; consent of instructor. Extensive examination of one or more special problems in foreign policy. May be repeated one time for credit. Offered irregularly.

**140A. Comparative Political Institutions: Electoral Systems (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 recommended. Workings of electoral institutions, focusing on systems used to elect presidents and assemblies, pass laws, and generally make decisions. Examples from systems throughout the world, including cases from both the advanced industrial and developing worlds. Offered irregularly. GE credit: SocSci, Wrt | QL, SS, WE.

**140B. Comparative Political Institutions: Parties (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 recommended; consent of instructor. The factors shaping political parties and their role in democratic representation. Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WE.

**140C. Comparative Political Institutions: Legislatures (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 recommended; consent of instructor. Examination of legislatures from a comparative perspective. Offered irregularly. GE credit: SocSci, Wrt | SS, WE.

**140D. When Institutions Fail (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 recommended. Examination of factors contributing to the success and failure of political institutions. Offered in alternate years. GE credit: QL, SS, WE.—F, S. (F, S.)

**140E. Policy-Making Processes (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 recommended. Comparative analysis of policy-making in the U.S. and other countries. Offered irregularly. GE credit: QL, SS, WE.—F, S. (F, S.)

**142A. Comparative Development: Political Development in Modernizing Societies (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 recommended; consent of instructor. Nature and sequence of political development; its economic and social concomitants; role of elites, military, bureaucracy, and party systems; social stratification and group politics; social mobilization and political participation; instability, violence, and the politics of integration. Offered irregularly. GE credit: SocSci, Wrt | SS, WC, WE.

**142B. Comparative Development: Politics and Inequality (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 recommended; consent of instructor. Linkages between politics and the distribution of social and economic goods. Impact of civil rights legislation, the politics of welfare states, and the effects of political participation on the distribution of goods. Offered irregularly. GE credit: SocSci, Wrt | SS, WC, WE.

**142C. Comparative Political Development: Democracy and Democratization (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 recommended. Examination of conditions promoting democratization and democratic stability. Offered irregularly. GE credit: SS, WE.—F, S. (F, S.)

**143A. Latin American Politics (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 recommended. Issues related to democratic consolidation in Latin America, with a regional focus on South America. Topics include transitions to democracy, the role of the military, political economy, and political behavior. Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WC, WE.

**143B. Mexican Politics (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 recommended. Introduction to the politics of contemporary Mexico. Focus on rise, fall, and aftermath of Mexico's one-party dominant system. Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WC, WE.

**144A. Politics of Post-Communist Countries: East European Politics (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 recommended. Post-war democratization, state-building and economic reform in East European states. Offered irregularly. GE credit: SocSci, Wrt | SS, WC, WE.

**144B. Politics of Post-Communist Countries: Russia (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 recommended. Democratization, state-building and economic reform; creation of new institutions; impacts of Soviet rule. Offered irregularly. GE credit: SocSci, Wrt | SS, WC, WE.

**146A. Politics of Africa: Issues in Contemporary African Politics (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 recommended. African politics since the end of the Cold War. Topics include: Strategic Security Approach, Democratization, Human Rights, HIV/AIDS, African Peacekeeping, Terrorism, Religious and Ethnic Conflict, Debt and Stalled Development. Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WC, WE.

Security Approach, Democratization, Human Rights, HIV/AIDS, African Peacekeeping, Terrorism, Religious and Ethnic Conflict, Debt and Stalled Development. Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WC, WE.

**146B. Politics of Africa: Development in Africa (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 recommended. Political and economic development within Sub-Saharan Africa. States and institutions, democracy, party systems, military coups/rule, bureaucracy/corruption, race/ethnicity, national/regional integrations, trade unions, economic development strategies, class formation, and women's roles and ideology. Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WC, WE.

**147A. West European Politics (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 recommended; consent of instructor. The evolution, politics, and contemporary problems of selected political systems of Western Europe. Offered irregularly. GE credit: SocSci, Wrt | SS, WC, WE.

**147B. West European Politics: British Politics (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 recommended; consent of instructor. The evolution, politics, and contemporary problems of Britain's political system. Offered irregularly. GE credit: SocSci, Wrt | SS, WC, WE.

**147C. West European Politics: French Politics (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 recommended; consent of instructor. The evolution, politics and contemporary problems of France's political system. Offered irregularly. GE credit: SocSci, Wrt | SS, WC, WE.

**147D. West European Politics: German Politics (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 recommended. Political Science & International Relations Majors. Evolution, politics and contemporary problems of Germany's political system. Offered irregularly. GE credit: SocSci, Wrt | SS, WC, WE.

**148A. Government and Politics of East Asia: China (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 recommended. Evolution of political institutions and political culture in China with emphasis on the post-1949 period. Primary attention to nationalism, modernization and political efficacy. Offered irregularly. GE credit: SocSci, Wrt | SS, WC, WE.

**148B. Government and Politics in East Asia: Japan (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 recommended. Japanese politics, with an emphasis on the postwar period. Particular emphasis on political parties, elections, political economy, and social problems. Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WC, WE.

**148C. Government and Politics in East Asia: Southeast Asia (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 recommended. Evolution of political institutions and economy of selected nations in Southeast Asia. Emphasis on imperialist legacy, nation building in multi-ethnic communities, and contrasts in economic performance. Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WC, WE.

**150. Judicial Politics and Constitutional Interpretation (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended. Politics of judicial policy making, issues surrounding constitutional interpretation and decision making, prerequisite for courses on the politics of constitutional law. Offered irregularly. GE credit: SocSci, Wrt | ACGH, DD, SS, WE.

**151. The Constitutional Politics of the First Amendment and the Right to Privacy (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended. The constitutional politics surrounding such issues as the right to free expression, associational rights, the right to free exercise of religious beliefs and the right to privacy. Offered irregularly. GE credit: SocSci, Wrt | ACGH, DD, SS, WE.

**152. The Constitutional Politics of Equality (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended. Constitutional politics of equality in the American political system; issues surrounding constitutional doctrine and judicial policymaking; special attention on racial and sexual equality. Offered irregularly. GE credit: SocSci, Wrt | ACGH, DD, SS, WE.

**153. The Constitutional Politics of the Justice System (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended. Constitutional politics of the American criminal justice system. Issues surrounding constitutional doctrine and judicial policymaking on issues such as search and seizure, arrest, trial, incarceration and other issues of due process. Offered irregularly. GE credit: SocSci, Wrt | ACGH, DD, SS, WE.

**154. Legal Philosophy (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended. Analysis of the nature and functions of law; law as an instrument of social control and the relationship between law and morality. Offered irregularly. GE credit: SocSci, Wrt | SS, WE.

**155. Judicial Process and Behavior (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended. Analysis of the behavior of judges and courts in the political process. Techniques of judicial decision making. Relationships among courts and other decisionmaking bodies. Offered irregularly. GE credit: SocSci, Wrt | ACGH, SS, WE.

**160. American Political Parties (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended. Analysis of the structured operations of the party system in the United States; party functions and organizations, nomination processes, campaigns and elections, party trends and reforms. Offered irregularly. GE credit: SocSci, Wrt | ACGH, DD, QL, SS, WE.

**162. Elections and Voting Behavior (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended. Analysis of American elections and partisan behavior; political socialization, political participation, partisanship and individual and group determinants of voting. Offered irregularly. GE credit: SocSci, Wrt | ACGH, DD, SS, WE.

**163. Group Politics (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended. Groups, institutions and individuals, especially in American politics. Historical and analytical treatment of group theories as applied to interest groups (especially labor, business, agriculture, science, military); to racial, ethnic and sectional groups; to parties, public and legislative groups, bureaucracies. Offered irregularly. GE credit: SocSci, Wrt | ACGH, DD, SS, WE.

**164. Public Opinion (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended; consent of instructor. Nature of public opinion in America as it is supposed to be and as it is. Distribution of opinions among different publics and the significance of that distribution for system stability and institutions. Opinion polling and its problems. Offered irregularly. GE credit: SocSci, Wrt | ACGH, DD, SS, WE.

**165. Mass Media and Politics (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended. Organization of and decision making within the media; media

audiences and the effect of the media on attitudes and behavior; the relationship of the government to the media (censorship, secrecy, freedom of the press, government regulation); the media in election campaigns. Offered irregularly. GE credit: SocSci, Wrt | SS, WE.

#### **166. Women in Politics (4)**

Lecture—3 hours; discussion—1 hour or seminar—1 hour. Prerequisite: course 1 recommended. The role of women in American politics. Historical experiences; contemporary organizations and strategies; areas of legislative concern; the impact of differences in social class, race, and ethnicity upon the involvement of women in politics. Offered irregularly. GE credit: SocSci, Wrt | ACGH, DD, SS, WE.

#### **168. Chicano Politics (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended. Political aspects of Chicano life in America; examines the Chicanos political role as it has been historically defined by different groups in society and the Chicanos responses to his/her political environment. Offered irregularly. GE credit: SocSci, Wrt | ACGH, DD, SS, WE.

#### **170. Political Psychology (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended. Overview to the growing literature on political psychology. Introduction to how psychological concepts (personality, attitudes, stereotypes, heuristics, affect, identity, group dynamics) help us understand how citizens think about politics. Offered irregularly. GE credit: SocSci, Wrt | SS, WE.

#### **171. The Politics of Energy (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended. Nature and performance of political processes for making energy choices at the international, national and state levels. Interaction of energy policy with other political goals and the ability of governmental institutions to overcome constraints on policy innovation. Offered irregularly. GE credit: SocSci, Wrt | SS, WE.

#### **172. American Political Development (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended. Systematic analysis of contemporary issues in American political development: historical determinants of political change; the timing and character of institutional development; conditions for successful political action. Democratization, cultural change, party formation, state-building, constitutionalism, race relations. Offered irregularly. GE credit: SocSci, Wrt | ACGH, DD, SS, WE.

#### **174. Government and the Economy (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended. Political basis of economic policy (taxation, spending and regulation); impact of prices, employment and growth on political demands; elite responses to economic conditions; policy alternatives and the public interest. Offered irregularly. GE credit: SocSci, Wrt | SS, WE.

#### **175. Science, Technology, and Policy (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended; consent of instructor. Analysis of policymaking for science and the use of scientific expertise for making decisions about technology. Topics include funding of basic research, relationship of science to technological development, science and military policy, technological risks, technology assessment and scientists and politics. Offered irregularly. GE credit: SocSci, Wrt | QL, SS, WE.

#### **176. Racial Politics (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended. Race, racial attitudes and racial policies in the United States with a specific emphasis on African Americans. Offered irregularly. GE credit: SocSci, Div, Wrt | ACGH, DD, SS, WE.

#### **179. Special Studies in Comparative Politics (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 recommended; consent of instructor. Intensive examination of one or more special problems appropriate to comparative politics. Coverage is given to formal and informal political institutions, economically developing and developed countries, and non-democratic, democratic, and democratizing countries. May be repeated one time for credit. Offered irregularly. GE credit: SocSci, Wrt | SS, WE.

#### **180. Bureaucracy in Modern Society (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 or course 2 recommended; consent of instructor. Role of bureaucracy in a complex society, with emphasis upon changing relationships between government and the economy; consequences of rapid technological and social change for bureaucratic structures and processes; the problems of reconciling expertise and democracy and increasing the responsiveness of public bureaucracy. Offered irregularly. GE credit: SocSci, Wrt | ACGH, SS, WE.

#### **183. Administrative Behavior (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 recommended. The implications for American public administration of evolving concepts about behavior in organizations. Offered irregularly. GE credit: SocSci, Wrt | ACGH, SS, WE.

#### **187. Administrative Theory (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 4 recommended. Historical and critical analysis of the principal theories of organization and management of public agencies in light of such concepts as decision making, bureaucracy, authority and power, communication and control; examination of role of government bureaucracies in the total society. Offered irregularly. GE credit: SocSci, Wrt | SS, WE.

#### **190. International Relations (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 3 recommended; consent of instructor. Analysis and evaluation of substantive issues in contemporary international relations. Readings drawn from current academic and non-academic periodicals. GE credit: SocSci, Wrt | SS, WE.

#### **192A. Internship in Public Affairs (5)**

Prerequisite: enrollment dependent on availability of intern positions with highest priority assigned to students with Political Science—Public Service major; upper division standing. Supervised internship and study in political, governmental, or related organizations. (P/NP grading only.) GE credit: ACGH, SS, WE.

#### **192B. Internship in Public Affairs (5)**

Prerequisite: course 192A; enrollment dependent on availability of intern positions with highest priority assigned to students with Political Science—Public Service major; upper division standing. Supervised internship and study in political, governmental, or related organizations. (P/NP grading only.) GE credit: ACGH, SS, WE.

#### **193. Research in Practical Politics (2)**

Research project—6 hours. Prerequisite: courses 192A, 192B; open only to Political Science—Public Service majors, for whom it is required. Supervised preparation of an extensive paper relating internship experience to concepts, literature, and theory of political science. GE credit: SocSci | SS, WE.

#### **193W. Washington Center Research Seminar (4)**

Lecture/discussion—1 hour; independent study—3 hours; tutorial—0.5 hour. Prerequisite: course 192W concurrently. Core academic component of Washington Program. Topics coordinated with internships. Research draws on resources uniquely available in Washington, DC. Supervised preparation of extensive paper. (Same course as UC Davis Washington Center 193.) GE credit: SocSci, Wrt | OL, SS, WE.

#### **194HA. Special Study for Honors Students (4)**

Seminar—2 hours; independent study—2 hours. Prerequisite: major in Political Science with upper division standing and a GPA of 3.500 in the major. Directed reading, research and writing culminating in preparation of a senior honors thesis under the direction of faculty adviser. (Deferred grading only, pending completion of sequence.) Offered irregularly. GE credit: SocSci | OL, SS, VL, WE.

#### **194HB. Special Study for Honors Students (4)**

Seminar—2 hours; independent study—2 hours. Prerequisite: major in Political Science with upper division standing and a GPA of 3.500 in the major. Directed reading, research and writing culminating in preparation of a senior honors thesis under the direction of faculty adviser. (Deferred grading only, pending completion of sequence.) Offered irregularly. GE credit: SocSci | OL, SS, VL, WE.

#### **195. Special Studies in American Politics (4)**

Seminar—4 hours. Prerequisite: consent of instructor and upper division standing. Intensive examination of one or more special problems appropriate to American politics. May be repeated one time for credit when topic differs. GE credit: SocSci | ACGH, SS, WE.

#### **196A. Seminar in American Politics (4)**

Seminar—3 hours; term paper. Prerequisite: upper division political science major or consent of instructor. Intensive reading, discussion, research, writing in American politics. Topics may include Congress, the Presidency, the Supreme Court, federalism, voting behavior, interest groups, ethnic groups or other topics with a more specialized content than normal course offerings. May be repeated one time for credit when topic differs. GE credit: SocSci | ACGH, SS, WE.—F, W, S.

#### **196B. Seminar in Comparative Politics (4)**

Seminar—3 hours; term paper. Prerequisite: upper division political science major or consent of instructor. Intensive reading, discussion, research, writing in comparative politics. Topics may include one country or geographical area, political institutions or behavior across countries, political development, or other topics that are more specialized than normal course offerings. May be repeated one time for credit when topic differs. GE credit: SocSci | SS, WE.

#### **196C. Seminar in International Relations (4)**

Seminar—3 hours; term paper. Prerequisite: upper division political science major or consent of instructor. Intensive reading, discussion, research, writing in international relations including study of international political institutions (UN, EU, or NATO) or interstate relations (war, trade, immigration) and other topics with more specialized content than normal course offerings. May be repeated one time for credit when topic differs. GE credit: SocSci | SS, WE.

#### **196D. Seminar in Political Theory (4)**

Seminar—3 hours; term paper. Prerequisite: upper division political science major or consent of instructor. Intensive reading, discussion, research, writing in political theory. Topics may include study of a single political thinker, a group of related thinkers, development of political concepts, or other topics with more specialized content than normal course offerings. May be repeated one time for credit when topic differs. GE credit: SocSci | SS, WE.

#### **196E. Seminar in Research Methods (4)**

Seminar—3 hours; term paper. Prerequisite: upper division political science major or consent of instructor. Intensive reading, discussion, research, and writing in selected topics in research methods such as research design, statistics, game theory. May be repeated one time for credit when topic differs. GE credit: SocSci | QL, SS, VL, WE.

#### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.)

**Graduate**

**201. Urban Government and Politics (4)**

Seminar—4 hours. Survey and analysis of the literature in the field of local government and politics in the United States. Approaches to the study of political reform, local autonomy, community power, representation, expertise, service delivery, policymaking and political change. Offered in alternate years.

**202. American State Government and Politics (4)**

Seminar—4 hours. Survey and analysis of the literature in the field of state government, politics, and policy. Approaches to the study of the American states as political systems, including their governing institutions and processes and their role in the Federal system. Offered in alternate years.

**203A. American Government: The Presidency (4)**

Seminar—3 hours; term paper. Restricted to graduate students only. Thorough overview of the current research on political executives, with particular emphasis on the American presidency. Two principal goals: the development of important and innovative student research programs; and adequate preparation for qualifying examinations.

**203B. American Government: Congress (4)**

Seminar—3 hours; term paper. Restricted to graduate students only. Thorough overview of the current research on Congress, with particular emphasis on political representation. Two principal goals: the development of important and innovative student research programs; and adequate preparation for qualifying examinations.

**203C. American Government: Courts (4)**

Seminar—4 hours. Survey and analysis of the literature in the field of American government with a focus on courts. Emphasis on the development and testing of theories of behavior and processes.

**207. Environmental Public Policy (4)**

Seminar—4 hours. Analysis of the interface between the world of academic reflection about ecological and environmental problems and the world of political action. Evaluation of alternative approaches to policy analysis and recommendation. Individual research, including field research, will parallel discussion of the literature.

**208. Policy Analysis (4)**

Seminar—4 hours. Social science techniques applied to public policy formation and evaluation.

**209. The American Political System (4)**

Seminar—3 hours; term paper. Restricted to graduate students only. Analysis of selected theoretical and empirical issues posed by contemporary research in American government and politics.

**210. Research Design in Political Science (4)**

Seminar—3 hours; discussion/laboratory—1 hour. Prerequisite: graduate standing. Introduction to philosophy of science and research design for political science. Topics include: logic of empirical research, overview of research design approaches for political science research.

**211. Research Methods in Political Science (4)**

Seminar—3 hours; laboratory/discussion—1 hour. Prerequisite: graduate standing. Pass One open to graduate majors; Pass Two open to graduate students. Introductory seminar on the foundations of probability theory and mathematical statistics that are critical to empirical investigations in political science. —F. (F.) Joyce

**212. Quantitative Analysis in Political Science I (4)**

Seminar—3 hours; laboratory/discussion—1 hour. Prerequisite: course 211. Pass One open to graduate majors; Pass Two open to graduate students. Seminar provides students with an introduction to the linear regression model. Students who complete the

course will have a working knowledge of basic regression techniques and problems. —W. (W.) Huckfeldt

**213. Quantitative Analysis in Political Science II (4)**

Seminar—3 hours; term paper. Prerequisite: courses 211, 212. Pass One open to graduate majors; pass 2 open to graduate students. More advanced topics in the use of statistical methods, with emphasis on political applications. Topics include: properties of least squares estimates, problems in multiple regression, and advanced topics (probit analysis, simultaneous models, time-series analysis, etc.).

**214A. Research in Political Science (4)**

Discussion—2 hours; lecture—1 hour; term paper. Prerequisite: course 213. Advanced level graduate students in the Department of Political Science only. Research seminar sequence required of all Ph.D. students. Design, execution, and defense of an original piece of research in political science, culminating in a paper of publishable quality. (Deferred grading only, pending completion of sequence.)

**214B. Research in Political Science (4)**

Discussion—2 hours; lecture—1 hour; term paper. Prerequisite: courses 212 and 214A. Advanced level graduate students in the Department of Political Science only. Research seminar sequence required of all Ph.D. students. Design, execution, and defense of an original piece of research in political science, culminating in a paper of publishable quality. (Deferred grading only, pending completion of sequence.)

**215. Introduction to Modeling Political Behavior (4)**

Seminar—3 hours; term paper. Prerequisite: courses 211, 212. Pass One open to graduate majors; pass 2 open to graduate students. Introduction to formal and game theoretic analyses of politics. Students will learn basic game theory and modeling skills. We examine the benefits of modeling, and look at examples of formal analysis in a variety of political science subfields.

**216. Qualitative Research Methods (4)**

Seminar—3 hours; term paper. Methodology for utilizing theoretically-oriented case studies and controlled comparison of a small number of cases to develop and test theories. Examination of how the case study method complements experimental, statistical and deductive modes of research. Offered in alternate years.

**217. Social Choice Theory and Spatial Modeling (4)**

Seminar—4 hours. Introduction to social choice theory and formal spatial modeling including Arrow's Theorem, the paradox of voting, cycling and agenda control. Focus on mastering modeling techniques as well as interpretation of classic works. Offered in alternate years.

**218. Topics in Political Theory (4)**

Seminar—3 hours; term paper. Topics vary and may be the work of a single theorist, time period, or political concept, such as justice. May be repeated three times for credit when topic differs.

**219A. Political Theory Sequence (4)**

Seminar—3 hours; term paper. Survey of the great works in ancient and medieval political theory including such writers as Plato, Aristotle, Cicero, St. Augustine, Aquinas, Alfarabi and Marsilius. Discussion of various interpretations of these authors. Offered in alternate years.

**219B. Political Theory Sequence (4)**

Seminar—3 hours; term paper. Survey of the great works in early modern to contemporary political theory including such writers as Machiavelli, Hobbes, Locke, Rousseau, Marx, Mill, Nietzsche, and Rawls. Discussion of various interpretations of these authors. Offered in alternate years.

**219C. Contemporary Political Theory (4)**

Seminar—3 hours; term paper. Survey of important works in contemporary political theory including such writers as Nietzsche, Heidegger, Arendt, Rawls, Nozick, Sandel. May be repeated for credit if topic differs.

**220. Seminar in Political Theory (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Open to graduate students only. Introduction to political theory and current debates over its study. Readings from and textual interpretations of political theory including the Federalist Papers and major works by thinkers such as Plato, Aristotle, Machiavelli, Hobbes, Locke, Rousseau, and Rawls. Other readings addressing issues of textual interpretation.

**223. International Relations (4)**

Seminar—3 hours; term paper.

**225. The International System (4)**

Seminar—3 hours; term paper. Analysis of the international system by means of theory formulation and integration; critique of research designs; use of various techniques of data generation and analysis.

**226. Seminar in International Political Economy (4)**

Seminar—3 hours; term paper. Restricted to graduate students. Research in international political economy. Structure of the global economy, as well as specific dimensions of international economic relations, including trade, capital flows, global production structures, and migration. Offered in alternate years.

**230. American Foreign Policy (4)**

Seminar—3 hours; term paper.

**231. U.S. Political Culture and Foreign Relations (4)**

Seminar—3 hours; term paper. Relates U.S. political culture to formulation of foreign policy. Analyzes American ideological preferences in historical perspective, contemporary public opinion, decision making and implementation. Concludes by examining linkages between foreign policy behavior and democratic process. Offered in alternate years.

**241. Communist Political Systems (4)**

Seminar—4 hours. Prerequisite: course 141 or the equivalent, or consent of instructor. Systematic analysis of selected topics dealing with the political process of communist political systems.

**242. Seminar in Comparative Politics (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Systematic survey of theories and methods used in the study of comparative politics.

**243. Comparative Institutional Change (4)**

Seminar—3 hours; term paper. Restricted to graduate students. Comparison of institutional changes in countries of the former Soviet Union and Eastern Europe during the period of transition to democracy. Special attention to institutions of mass representation—electoral and party systems and national legislatures. Offered in alternate years.

**246. Policymaking in Third-World Societies (4)**

Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Included in an analysis of policymaking process in Third-World countries are such topics as political resources, institutional resources, decision making, resource allocations, planning, and budgeting, implementation, and distribution of world resources. Offered in alternate years.

**250. Policy Development and Impact in U.S. Courts (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Thorough overview of the literature regarding courts as policymaking institutions of government, with emphasis on the formation and implementation of judicial policy. Differences and similarities across the judicial, congressional, and executive branch policy processes. Offered in alternate years.

**260. Political Parties (4)**

Seminar—3 hours; term paper. Survey of selected topics in American and comparative parties.

**261. Political Behavior (4)**

Seminar—3 hours; term paper. Survey of selected topics in political behavior and public opinion. May be repeated three times for credit when topic differs.

**274. Political Economy (4)**

Seminar—3 hours; term paper. Restricted to graduate students. Politics of economic policy as reflected in taxation, spending and regulation; impact of prices, employment, and growth on political demands; government responses to economic conditions; electoral politics and the political business cycle. Offered in alternate years.

**279. Political Networks: Methods and Applications (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Structure of political networks, socio-matrices and affiliation networks; general networks characteristics: density, centralization, polarization, interdependence, dyadic and triadic characteristics; structural and role equivalence; subsets of networks: cliques, blocks and bloc modeling; characteristics of individuals in networks: centrality and prestige.

**280. Bayesian Methods: for Social and Behavioral Sciences (4)**

Seminar—3 hours; term paper. Prerequisite: course 212 or equivalent. Pass One open to graduate majors only; Pass Two open to graduate students. Methodology seminar introducing Bayesian quantitative methods to issues and problems in political science and other social and behavioral sciences. Offered in alternate years.

**281. Statistical Computing Issues in Political Science (4)**

Seminar—3 hours; discussion/laboratory—1 hour. Prerequisite: course 213 or equivalent. Restricted to graduate standing. Methodology seminar introducing computing issues in empirical models for political science and other social and behavioral sciences. Offered in alternate years.

**282. Advanced Modeling of Political Behavior (4)**

Seminar—3 hours; term paper. Prerequisite: course 215 or equivalent. Restricted to graduate standing or with instructors permission. Applications of formal theory to political science. Review of relevant contributions in other social sciences. Consideration of advanced techniques in game theory. Rational and behavioral approaches.

**283. Organizational Behavior (4)**

Seminar—4 hours. Organizational behavior as it relates to public sector decision making.

**284. Advanced Network Analysis (4)**

Seminar—3 hours; term paper. Prerequisite: course 211, 212, 279. Exponential Random Graph Models (ERGMS) of networks, game theoretic models of network formation and network dynamics, diffusion processes, shocks and network collapse, percolation, cross-network spillover processes, social and political applications of advanced network models. Offered in alternate years.—Maoz, Zeev

**290A. Research in American Government and Public Policy (4)**

Seminar—3 hours; term paper. Restricted to graduate students. Special research seminar on problems and issues in the study of American government and public policy. May be repeated up to 6 times for credit if topic differs.

**290B. Research in Political Theory (4)**

Lecture—3 hours; term paper. Restricted to graduate students only. Special research seminar on problems and issues in the study of political theory. May be repeated six times for credit if topic varies.

**290C. Research in International Relations (4)**

Lecture—3 hours; term paper. Restricted to graduate students only. Special research seminar on select problems and issues in the study of international relations. May be repeated six times for credit if topic varies.

**290D. Research in Judicial Politics (4)**

Seminar—4 hours. Prerequisite: graduate standing in political science or consent of instructor. Contemporary research on judicial politics, judicial institutions, jurisprudence, and judicial behavior.

**290E. Research in Political Parties, Politics, and Political Behavior (4)**

Seminar—4 hours. Special research seminar on selected problems and issues in the study of political parties, politics, and political behavior.

**290F. Research in Comparative Government and Policy (4)**

Lecture—3 hours; term paper. Restricted to graduate students only. Special research seminar on select problems and issues in the study of comparative government and policy. May be repeated six times for credit if topic varies.

**290G. Research in Methodology (4)**

Lecture—3 hours; term paper. Prerequisite: course 212. Special research seminar on selected problems and issues in methods in political science. May be repeated three times for credit if topic varies.

**297. Internships in Political Science (2)**

Seminar—2 hours. Prerequisite: open only to persons who have internships or other positions in governmental agencies, political parties, etc. Application and evaluation of theoretical concepts through work experience or systematic observation in public and political agencies. May be repeated for credit. (S/U grading only.)

**298. Group Study (1-5)**

(S/U grading only.)

**299. Research (1-12)**

(S/U grading only.)

**299D. Directed Reading (1-12)**

(S/U grading only.)

**Professional****390. The Teaching of Political Science (1)**

Seminar—1 hour. Prerequisite: graduate student standing in Political Science. Methods and problems of teaching political science at the undergraduate level. (S/U grading only.)

**396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## Pomology

See [Plant Sciences](#), on page 514.

## Population Biology (A Graduate Group)

Alan M. Hastings, Ph.D., Chairperson of the Group

**Group Office.** 2320 Storer Hall

530-752-1274;

<http://www.eve.ucdavis.edu/eve/pbg/>

**Faculty**

Marissa L. Baskett, Ph.D., Associate Professor (*Environmental Science and Policy*)

David J. Begun, Ph.D., Professor (*Evolution and Ecology*)

Monique Borgerhoff Mulder, Ph.D., Professor (*Anthropology*)

Louis W. Botsford, Ph.D., Professor (*Wildlife, Fish, and Conservation Biology*)

Tim Caro, Ph.D., Professor (*Wildlife, Fish, and Conservation Biology*)

Graham M. Coop, Ph.D., Associate Professor (*Evolution and Ecology*)

Howard V. Cornell, Ph.D., Professor (*Environmental Science and Policy*)

Jonathan A. Eisen, Ph.D., Professor (*Evolution and Ecology*)

Valerie Evner, Ph.D., Associate Professor (*Plant Sciences*)

Jennifer Gremer, Ph.D., Assistant Professor (*Evolution and Ecology*)

James R. Griesemer, Ph.D., Professor (*Philosophy*)  
Richard K. Grosberg, Ph.D., Professor (*Evolution and Ecology*) *Academic Senate Distinguished Teaching Award, UC Davis Prize for Teaching and Scholarly Achievement*

Susan P. Harrison, Ph.D., Professor (*Environmental Science and Policy*)

Alan M. Hastings, Ph.D., Professor (*Environmental Science and Policy*)  
Brian R. Johnson, Ph.D., Assistant Professor (*Entomology and Nematology*)

Richard Karban, Ph.D., Professor (*Entomology*)  
Daniel Kliebenstein, Ph.D., Professor (*Plant Sciences*)

Aryton Kopp, Ph.D., Professor (*Evolution and Ecology*)

Charles H. Langley, Ph.D., Professor (*Evolution and Ecology*)

Sharon P. Lawler, Ph.D., Professor (*Entomology*)

Susan E. Lott, Ph.D., Assistant Professor (*Evolution and Ecology*)

Richard McElreath, Ph.D., Professor (*Anthropology*)  
Brian R. Moore, Ph.D., Assistant Professor (*Evolution and Ecology*)

David B. Neale, Ph.D., Professor (*Plant Sciences*)  
Gail L. Patricelli, Ph.D., Professor (*Evolution and Ecology*)

Santiago Ramirez, Ph.D., Assistant Professor (*Evolution and Ecology*)

Bruce H. Rannala, Ph.D., Professor (*Evolution and Ecology*)

Jay Rosenheim, Ph.D., Professor (*Entomology*) *Academic Senate Distinguished Teaching Award*

Jefferey Ross-Ibarra, Ph.D., Associate Professor (*Plant Sciences*)

Eric D. Sanford, Ph.D., Professor (*Evolution and Ecology*)

Johanna Schmitt, Ph.D., Professor (*Evolution and Ecology*)

Thomas W. Schoener, Ph.D., Professor (*Evolution and Ecology*)

Sebastian Schreiber, Ph.D., Professor (*Evolution and Ecology*)

Mark W. Schwartz, Ph.D., Professor (*Environmental Science and Policy*) *Academic Senate Distinguished Teaching Award*

Arthur M. Shapiro, Ph.D., Professor (*Evolution and Ecology*) *Academic Senate Distinguished Teaching Award*

Andrew Sih, Ph.D., Professor

(*Environmental Science and Policy*)

John J. Stachowicz, Ph.D., Professor (*Evolution and Ecology*) *Academic Senate Distinguished Teaching Award*

Maureen L. Stanton, Ph.D., Professor (*Evolution and Ecology*) *UC Davis Prize for Teaching and Scholarly Achievement*

Sharon Y. Strauss, Ph.D., Professor (*Evolution and Ecology*)

Donald R. Strong, Ph.D., Professor (*Evolution and Ecology*)

Michael Turelli, Ph.D., Professor (*Evolution and Ecology*)

Geerat J. Vermeij, Ph.D., Professor (*Department of Earth and Planetary Sciences*)

Peter C. Wainwright, Ph.D., Professor (*Evolution and Ecology*) *Academic Senate Distinguished Teaching Award*

Philip S. Ward, Ph.D., Professor (*Entomology*)  
Andrew Whitehead, Ph.D., Associate Professor (*Environmental Toxicology*)

Louie H. Yang, Ph.D., Assistant Professor (*Entomology*)

Truman P. Young, Ph.D., Professor (*Plant Sciences*)

**Emeriti Faculty**

Hugh Dingle, Ph.D., Professor Emeritus

John H. Gillespie, Ph.D., Professor Emeritus

Kevin J. Rice, Ph.D., Professor Emeritus

Judy A. Stamps, Ph.D., Professor Emeritus

**Graduate Study.** The Graduate Group in Population Biology emphasizes programs of study and research leading to the Ph.D. degree. The Group concentrates on population biology as the broad discipline that blends ecology, evolution, population genetics and systematics into a unified field. The course curriculum consists of first-year core courses offered by the Group faculty, seminars, and advanced courses in population biology, and related disciplines, chosen in consultation with a guiding committee.

**Graduate Adviser.** Consult the Population Biology Graduate Group office or website.

## Courses in Population Biology (PBG)

### Graduate

#### 200A. Principles of Population Biology (5)

Lecture—3 hours; discussion—2 hours. Prerequisite: course 231 concurrently and consent of instructor. Principles of single-species ecology and evolution. Topics include ecology of individuals, population growth models, structured populations, life history strategies, stochastic populations, basic population genetics theory, deleterious alleles in natural populations, and molecular population genetics. —F. (F.)

#### 200B. Principles of Population Biology (6)

Lecture—5 hours; discussion—1 hour. Prerequisite: course 200A, 231. Principles of multi-species communities. Topics include competition, mutualism, metapopulations, food webs and trophic cascades, interactions between simple ecological communities, island biogeography, succession, and large-scale patterns. —W. (W.)

#### 200C. Principles of Population Biology (6)

Lecture—5 hours; discussion—1 hour. Prerequisite: course 200B. Principles of microevolution and macroevolution. Topics include evolutionary quantitative genetics, analysis of hybrid zones, speciation, the fossil record, biogeography, and phylogeny reconstruction. —S. (S.)

#### 203. Advanced Evolution (3)

Lecture—1 hour; discussion—2 hours. Prerequisite: graduate standing. Adaptation and speciation, and biochemical and morphological evolution in plants and animals with emphasis on the appropriateness of different methods of analysis. Offered in alternate years.

#### 206. Ecology of Insect Parasitoids (4)

Lecture—3 hours; seminar—1 hour. Prerequisite: introductory animal ecology or behavior. Insect parasitoids will be investigated as model systems to address current topics in behavioral, population, and evolutionary ecology. Theory will be synthesized and critical empirical tests of ecological hypotheses emphasized. Offered in alternate years.

#### 207. Plant Population Biology (3)

Lecture—2 hours; laboratory/discussion—1 hour. Prerequisite: advanced undergraduate ecology course (e.g., Environmental Science and Policy 100, Evolution and Ecology 101, Entomology 104, Plant Biology 117), and advanced undergraduate course in genetics and/or evolution (e.g., Biological Sciences 101 or Evolution and Ecology 100). Introduction to theoretical and empirical research in plant population biology. Emphasis placed on linking ecological and genetic approaches to plant population biology. (Same course as Ecology 207.) Offered in alternate years. —W. (W.)

#### 212. Topics in Invertebrate Evolution (2)

Seminar—2 hours. Prerequisite: graduate standing or consent of instructor and Evolution and Ecology 112-112L; courses in evolutionary biology, systematics, and ecology highly recommended. Advanced seminar that critically examines problems relevant to evolutionary patterns among the invertebrates. May be repeated for credit when topic differs. (S/U grading only.)—(S.) Grosberg

#### 221. Animal Behavior, Ecology and Evolution (3)

Lecture—3 hours. Prerequisite: Neurobiology, Physiology, and Behavior 102, Evolution and Ecology 100, 101 or the equivalent, graduate standing, and consent of instructor. Interface between animal behavior, ecology and evolution. New developments in behavioral ecology and development and testing of hypotheses in this discipline. (Same course as Animal Behavior 221.)

#### 224. Field Reconnaissance for Population Biologists (2)

Fieldwork—6 hours. Prerequisite: graduate student in Population Biology, or consent of instructor. Biweekly field trips to acquaint students with plant and animal communities, biodiversity, and ecological and evolutionary research opportunities in northern and central California. May be repeated for credit. (S/U grading only.)

#### 225. Terrestrial Field Ecology (4)

Seminar—1 hour; field work—12 hours. Prerequisite: introductory ecology and introductory statistics, or consent of instructor. A field course conducted over spring break and four weekends at Bodega Bay emphasizing student projects. Ecological hypothesis testing, data gathering, analysis, and written and oral presentation of results will be stressed. (Same course as Ecology/Entomology 225.)—S. (S.) Karban

#### 231. Mathematical Methods in Population Biology (3)

Lecture—3 hours. Prerequisite: Mathematics 16C or 21C or the equivalent. Mathematical methods used in population biology. Linear and nonlinear difference equation and differential equation models are studied, using stability analysis and qualitative methods. Partial differential equation models are introduced. Applications to population biology models are stressed. (Same course as Ecology 231.)—F. (F.) Hastings

#### 233. Computational Methods in Population Biology (3)

Lecture/laboratory—2 hours; discussion/laboratory—1 hour. Prerequisite: a course in theoretical ecology (e.g., Ecology 231 or an equivalent to Environmental Science and Policy 121 from your undergraduate institution) or consent of instructor; no programming experience required. Numerical methods for simulating population dynamics using the computational software package R. Emphasis placed on model formulation and development, theoretical concepts and philosophical principles to guide simulation efforts, model parameterization, and implementing simulations with R. (Same course as Ecology 233.) (S/U grading only.) Offered in alternate years. —(W.) Baskett, Schreiber

#### 250A. Interdisciplinary Approaches to Biological Invasions (4)

Lecture/discussion—4 hours. Prerequisite: graduate standing. An integrative consideration of biological invasions, including an overview of concepts from ecology, ecological theory, evolution, genetics, philosophy, and other areas. Emphasis on potential contributions of each area for interdisciplinary problem solving. —S. (S.)

#### 250B. Interdisciplinary Approaches to Biological Invasions (4)

Lecture/discussion—4 hours. Prerequisite: graduate standing. An integrative consideration of biological invasions, including an overview of concepts from history, sociology, communications, law, policy, management, and other areas. Emphasis on potential contributions of each area for interdisciplinary problem solving. —W. (W.)

#### 251. Collaborative Project in Biological Invasions (3)

Project; discussion—1 hour. Prerequisite: course 250A, 250B, or equivalent; and consent of instructor. A year-long interdisciplinary collaborative project focusing on biological invasions, resulting in a paper or other suitable product presented at a sym-

posium at the conclusion of the project. May be repeated up to five times. (S/U grading only.)—F, W, S. (F, W, S.)

#### 270. Research Conference in Evolutionary Biology (1)

Seminar—1 hour. Prerequisite: consent of instructor. Critical presentation and evaluation of current literature and ongoing research in evolutionary biology. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

#### 271. Research Conference in Ecology (1)

Seminar—1 hour. Prerequisite: consent of instructor. Critical presentation and evaluation of current literature and ongoing research in ecology. Requirements include active participation in weekly discussions and the presentation of a paper or chapter once per quarter. May be repeated for credit. (S/U grading only.)—W. (W.) Schoener, Schreiber

#### 287. Advanced Animal Behavior (2)

Seminar—2 hours. Prerequisite: graduate standing and consent of instructor, courses in animal behavior (Neurobiology, Physiology, and Behavior 102 or the equivalent), and either evolution (Evolution and Ecology 100 or the equivalent) or ecology (Evolution and Ecology 101 or the equivalent). Reading, reports and discussion on current topics in animal behavior, with a focus on topics that lie at the interface between animal behavior, ecology and evolution. (Same course as Animal Behavior 287.) May be repeated two times for credit.

#### 290. Seminar (1)

Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Seminars presented by visiting lecturers, UC Davis graduate students and faculty. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

#### 290C. Research Conference in Population Biology (1)

Discussion—1 hour. Prerequisite: graduate standing and consent of instructor; concurrent enrollment in course 299. Presentation and discussion of faculty and graduate student research in population biology. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

#### 292. Topics in Ecology and Evolution (1)

Seminar—1 hour. Prerequisite: graduate standing. Seminar presented by visiting lecturers, UC Davis faculty and graduate students. May be repeated for credit. (Same course as Ecology 296.) (S/U grading only.)—F, W, S. (F, W, S.)

#### 296. Seminar in Geographical Ecology (2)

Seminar—2 hours. Prerequisite: Evolution and Ecology 100 or 101 or consent of instructor. Recent developments in theoretical and experimental biogeography, historical biogeography and related themes in systematics, the biology of colonizing species, and related topics. (Same course as Geography 214.) (S/U grading only.)—S. (S.) Shapiro

#### 298. Group Study (1-5)

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)—F, W, S. (F, W, S.)

#### 299. Research (1-12)

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)—F, W, S. (F, W, S.)

## Population Health and Reproduction

See Veterinary Medicine, School of, on page 581.

## Precision Agriculture

(College of Agricultural and Environmental Sciences)

The Department of Biological and Agricultural Engineering offers a minor in Precision Agriculture, the latest farming concept that optimizes fertilizer, pesti-

cide and water use, while minimizing environmental concerns.

### Minor Program Requirements:

This minor acquaints students with recent developments and their applications to agriculture, in geographic information systems (GIS), global positioning systems (GPS), variable rate technologies (VRT), crop and soil sensors, and remote sensing. The minor prepares students for challenging positions in site-specific crop management as we enter the "information age" in agriculture.

UNITS

#### Precision Agriculture ..... 18

Applied Biological Systems Technology/  
Landscape Architecture 150 and  
Environmental remote Sensing 186 and  
186L.....9  
Select 9 or more units from Applied Biological  
Systems Technology 181N, 182, Plant  
Sciences 100A, 100AL, 100B, 100BL,  
100C, 100CL, 110A, 110B, 110BL, 110C,  
Plant Sciences 120 or Statistics 100,  
Environmental and Resource Sciences 186,  
Soil Science 109 .....9

**Minor Advisers.** S.K. Upadhyaya, D.K. Giles

## Preventive Veterinary Medicine

See Veterinary Medicine, School of, on page 581.

## Psychiatry

See Medicine, School of, on page 427.

## Psychology

(College of Letters and Science)

Paul Hastings, Ph.D., Chairperson of the Department

**Department Office.** 135 Young Hall  
530-752-1880; <http://psychology.ucdavis.edu>

### Faculty

Karen L. Bales, Ph.D., Professor  
Wiebke Bleidorn, Ph.D., Assistant Professor  
Shelley A. Blozis, Ph.D., Associate Professor  
Lindsay C. Bowman, Ph.D., Assistant Professor  
Cameron S. Carter, M.D., Professor  
(*Psychiatry and Behavioral Sciences*)  
David P. Corina, Ph.D., Professor (*Linguistics*)  
Victoria L. Cross, Ph.D., Lecturer, PSOE  
Paul W. Eastwick, Ph.D., Associate Professor  
Arne D. Ekstrom, Ph.D., Associate Professor  
Robert A. Emmons, Ph.D., Professor  
Emilio Ferrer-Caja, Ph.D., Professor  
Maria Fernanda Ferreira, Ph.D., Professor  
Joy Geng, Ph.D., Associate Professor  
Simona Ghetti, Ph.D., Professor  
Gail S. Goodman, Ph.D., Professor  
Katharine Graf Estes, Ph.D., Assistant Professor  
Paul D. Hastings, Ph.D., Professor  
John M. Henderson, Ph.D., Professor  
Gregory M. Herek, Ph.D., Professor  
Camelia E. Hostinar, Ph.D., Assistant Professor  
Petr Janata, Ph.D., Professor  
Leah A. Krubitzer, Ph.D., Professor  
Kristin H. Lagattuta, Ph.D., Professor  
Alison M. Ledgerwood, Ph.D., Associate Professor  
Debra L. Long, Ph.D., Professor  
*Academic Senate Distinguished Teaching Award*  
Steven J. Luck, Ph.D., Professor  
George R. Mangun, Ph.D., Distinguished Professor  
Lisa M. Oakes, Ph.D., Professor  
Cynthia Pickett, Ph.D., Associate Professor

Charan Ranganath, Ph.D., Professor  
Philippe Rast, Ph.D., Associate Professor  
Susan M. Rivera, Ph.D., Professor  
Richard W. Robins, Ph.D., Professor  
Jeffrey C. Schank, Ph.D., Professor  
Eva Scheperle, Ph.D., Continuing Lecturer  
Jeffrey W. Sherman, Ph.D., Professor  
Danielle S. Stolzenberg, Ph.D., Assistant Professor  
Tamara Y. Swaab, Ph.D., Professor  
Ross A. Thompson, Ph.D., Professor  
Brian C. Trainor, Ph.D., Associate Professor  
Matthew J. Traxler, Ph.D., Professor  
Simine Vazire, Ph.D., Associate Professor  
Brian J. Wiltgen, Ph.D., Associate Professor  
Andrew P. Yonelinas, Ph.D., Professor  
Nolan W. Zane, Ph.D., Professor

### Emeriti Faculty

Linda P. Acredolo, Professor Emerita  
Jarvis R. Bastian, Ph.D., Professor Emeritus  
Rand D. Conger, Ph.D., Professor Emeritus  
(*Human Ecology*)  
Richard G. Coss, Ph.D., Professor Emeritus  
Alan C. Elms, Ph.D., Professor Emeritus  
Karen P. Erickson, Ph.D., Professor Emerita  
Albert A. Harrison, Ph.D., Professor Emeritus  
Kenneth R. Henry, Ph.D., Professor Emeritus  
Joel T. Johnson, Ph.D., Professor Emeritus  
Neal E. A. Kroll, Ph.D., Professor Emeritus  
William A. Mason, Ph.D., Professor Emeritus  
Sally Mendoza, Ph.D., Professor Emerita  
G. Mitchell, Ph.D., Professor Emeritus  
Robert M. Murphey, Ph.D., Professor Emeritus  
Thomas Natsoulas, Ph.D., Professor Emeritus  
Theodore E. Parks, Ph.D., Professor Emeritus  
Robert B. Post, Ph.D., Professor Emeritus  
Phillip R. Shaver, Ph.D., Professor Emeritus  
Dean K. Simonton, Ph.D., Distinguished Professor  
Emeritus UC Davis Prize for Teaching and  
Scholarly Achievement

Robert Sommer, Ph.D., Professor Emeritus  
Stanley Sue, Ph.D., Professor Emeritus  
Charles T. Tart, Ph.D., Professor Emeritus

### Affiliated Faculty

Eve A. Isham, Ph.D., Assistant Adjunct Professor  
Joanna E. Scheib, Ph.D., Associate Adjunct  
Professor

### The Major Programs

The psychology program at UC Davis is broad and includes students and faculty with a variety of interests. The department has developed around five major areas of emphasis:

*Perception, Cognition, and Cognitive Neuroscience (PCCN)* involves the study of awareness and thought, and includes such topics as perception, learning, memory, language and cognition.

*Biological Psychology* covers a broad spectrum of topics including evolutionary, neurobiological, and molecular mechanisms of behavior.

*Social-Personality Psychology* involves the study of the individual in his or her social environment and includes such topics as personality and individual differences, emotions, stereotyping and prejudice, intergroup relations, the psychology of religion and psychological health and dysfunction.

*Developmental Psychology* involves the study of changes in behavioral, cognitive, emotional, and social abilities that occur throughout the lifespan. Typical and atypical development are examined using a variety of methods including behavioral, neuroimaging, and physiological assessments.

*Quantitative Psychology* involves the study of linear and nonlinear models, psychometrics, mixed-effects models, and dynamic models, including experimental design, analysis of variance, regression, multivariate analysis, latent growth models, time series models, and factor analytic models.

The department offers the Bachelor of Arts (A.B.) program for students interested in the liberal arts and the Bachelor of Science (B.S.) program geared for students with an interest in either biology or mathe-

matics. The main objective of both programs is a broad introduction to the scope of contemporary psychology. In addition to completing a number of common core courses for their degree, students may take approved elective courses from a wide range of topics including Educational Psychology, Interpersonal Communication, and Psychological Anthropology, to name a few. The department strongly encourages students to become involved in individual research projects under the direction of faculty members and to participate in our internship program to broaden experience and understanding of the field of psychology.

**Preparatory Requirements.** Before declaring a major in Psychology, students must complete the following two courses with a combined grade point average of at least 2.500. Both courses must be taken for a letter grade.

UNITS

#### Psychology 1, 41 ..... 8

If a 2.500 GPA is not attained in these two courses, a 2.000 GPA in a minimum of three upper division Psychology courses is also acceptable for major declaration.

**Career Alternatives.** A degree in psychology provides broad intellectual foundations which are useful to the graduate for the development of careers in a variety of areas, including social work, teaching, business, management and counseling. An undergraduate education in psychology also provides excellent preparation for graduate study. Individuals with degrees in psychology may enter graduate programs to prepare for teaching, research, or clinical/counseling careers in psychology, or may go on to professional schools for training in veterinary and human medicine, law, and many other professions.

### A.B. Major Requirements:

UNITS

#### Preparatory Subject Matter ..... 17-20

Psychology 1 or the equivalent ..... 4  
Psychology 41 ..... 4  
Statistics 13 or 100 ..... 4  
Strongly recommended that Psychology 41 and Statistics 13 or 100 be completed in the first year.

Biological Sciences 2A; or a combination of Biological Sciences 10 and one course from: Anthropology 1, Molecular and Cellular Biology 10, or Neurobiology, Physiology, and Behavior 10 ..... 5 or 7-8

#### Depth Subject Matter ..... 40

Two courses from two of the following four groups and one course from the remaining two groups: ..... 23-24

Group A: Psychology 100 or 100Y, 130, 131, 132, 135, 136

Group B: Psychology 101, 113, 121, 122 (same course as Neurobiology, Physiology, and Behavior 150), 123 (same course as NPB 152), 124 (same course as Neurobiology, Physiology, and Behavior 124), 125, 126, 137, 159

Group C: Psychology 151, 152, 154, 158, 161, 162, 168

Group D: Psychology 140; (or Human Development 100A or 100B\*), Psychology 141 (same course as Human Development 101), Psychology 142 (same course as Human Development 102), 143, 146, 148

Approved Electives ..... 16-18  
Additional units chosen among Psychology courses and/or approved electives to achieve a total of 40 upper division units.

See list of approved electives below.

#### Total Units for the Major ..... 57-60

### Biological Emphasis

#### B.S. Major Requirements:

UNITS

#### Preparatory Subject Matter ..... 53-61

Psychology 1 or the equivalent ..... 4

Psychology 41 .....	4
Statistics 13 or 100 .....	4
Strongly recommended that Psychology 41 and Statistics 13 or 100 be completed in the first year.	
Mathematics 16A-16B or 17A-17B or 21A-21B.....	6-8
Physics 10 or 10C or 7A-7B.....	3-8
Biological Sciences 2A, 2B, 2C 15 Chemistry 2A, 2B.....	10
Chemistry 8A-8B or 118A-118B or 128A-128B.....	6-8
<b>Depth Subject Matter .....</b>	<b>49</b>
Seven Psychology courses distributed as specified:	
Group A: Two courses from: Psychology 100 or 100Y, 130, 131, 132, 135, 136.....	8
Group B: Three courses from: Psychology 101, 113, 121, 122 (same course as Neurobiology, Physiology, and Behavior 150), 123 (same course as Neurobiology, Physiology, and Behavior 152), 124 (same course as NPB 124), 125, 126, 137, 159 . 10-12	
Group C: One course from: Psychology 151, 152, 154, 158, 161, 162, 168.....	4
Group D: One course from: Psychology 140 (or Human Development 100A or 100B*), Psychology 141 (same course as Human Development 101), Psychology 142 (same course as Human Development 102), 143, 146, 148.....	4
Approved Electives.....	12-14
Additional units to achieve 40 upper division units chosen from Psychology courses and/or approved electives. See list of approved electives below.	
Biological Sciences 101 .....	4
Neurobiology, Physiology, and Behavior 101 .....	5
<b>Total Units for the Major .....</b>	<b>102-110</b>

**Recommended**

Psychology 180B, 199, on a Biological Psychology topic, Anthropology 154A, Environmental Science and Policy 110, Evolution and Ecology 100, 101.

**Quantitative Emphasis****B.S. Major Requirements:**

	UNITS
<b>Preparatory Subject Matter.....</b>	<b>41-54</b>
Psychology 1 or the equivalent.....	4
Psychology 41 .....	4
Statistics 13 or 100 .....	4
Strongly recommended that Psychology 41 and Statistics 13 or 100 be completed in the first year.	
Mathematics 21A, 21B, 21C .....	12
Computer Science Engineering 30 or Computer Science Engineering 10 .....	4
Chemistry 10 or 2A-2B or 2AH-2BH....	4-10
Physics 10 or 10C or 7A-7B.....	3-8
Biological Sciences 2A; or a combination of Biological Sciences 10 and one course from: Anthropology 1, Molecular and Cellular Biology 10, or Neurobiology, Physiology, and Behavior 10.....	5-8
<b>Depth Subject Matter .....</b>	<b>49</b>

Five Psychology courses, distributed as specified:

- Group A: Two courses from: 100 or 100Y, 130, 131, 132, 135, 136..... 8
- Group B: Two courses from: Psychology 101, 113, 121, 122/Neurobiology, Physiology, and Behavior 150, 123/ Neurobiology, Physiology, and Behavior 152, 124/Neurobiology, Physiology, and

Behavior 124, 125, 126, 127, 137, 159 6-8	
Group C: One course from: Psychology 151, 152, 154, 158, 161, 162, 168 or .....	
Group D: One course from: Psychology 140 (or Human Development 100A or 100B*), Psychology 141/Human Development 101, Psychology 142/Human Development 102, Psychology 143, 146, 148 .....	4
Psychology 103A.....	5
One course from: Psychology 103B, 104, or the equivalent.....	4-5
Approved Electives.....	10-13
Additional units to achieve 40 upper division units chosen from Psychology courses and/or approved electives. See list of approved electives below.	
One course sequence from: Statistics 106-108; 130A-130B; or 131A-131B .....	8

**Total Units for the Major .....****90-103**

**Recommended for All Majors.** Students who plan to do graduate work in any area of psychology are strongly encouraged to gain experience through research and internship activities.

**Major Advisers.** See staff advisers in 101 Young Hall; [psychadvising@ucdavis.edu](mailto:psychadvising@ucdavis.edu)

<http://psychology.ucdavis.edu/undergraduate/advising>

\* Students who have completed Human Development 100A or 100B prior to Psychology 140 will receive 2 units of credit for Psychology 140.

**Minor Program Requirements:**

	UNITS
<b>Psychology .....</b>	<b>24</b>

Psychology 41 (Please note that Psychology 1 is a prerequisite for Psychology 41 and all upper division Psychology courses)..... 4
One course from each of the following four groups..... 15-16
Group A: Psychology 100 or 100Y, 130, 131, 132, 135, 136
Group B: Psychology 101, 113, 121, 122/NPB 150, 123/NPB 152, 124/NPB 124, 125, 126, 127, 137, 159
Group C: Psychology 151, 152, 154, 158, 161, 162, 168
Group D: Human Development 100A, 100B, Psychology 140, 141/Human Development 101, 142/Human Development 102, 143, 146, 148
Approved Electives .....
Additional units to achieve 20 upper division units chosen from Psychology courses and/or approved electives. See list of approved electives below.

**Approved Electives:**

Any Psychology courses inside or outside Core Groups:	
AAS 141—Psychology of African American Experience .....	3
ANT 132—Psychological Anthropology....	4
CHI 120—Chicana/o Psychology.....	4
CHI 121—Chicana/o Community Mental Health .....	4
CHI 122—Psychological Perspectives on Chicana/o and Latina/o Family .....	4
CHI 123—Psychological Perspectives on Chicana/o and Latina/o Family Children and Adolescents .....	4
CMN 120—Interpersonal Communication	4
CMN 122—Nonverbal Communication ...	4
CNS 100—Consumer Behavior .....	3
EDU 110—Educational Psychology .....	4
EXB 102—Introduction to Motor Learning and the Psychology of Sport and Exercise.....	4
HDE 100A—Infancy and Early Development .....	4
HDE 100B—Middle Childhood and Adolescence .....	4

HDE 100C—Adulthood and Aging .....	4
HDE 117—Longevity (Same course as ENT 117).....	4
HDE 163—Cognitive Neuropsychology in Adulthood and Aging .....	4
LIN 171—Introduction to Psycholinguistics .....	4
NPB 102—Animal Behavior.....	3
NPB 168—Neurobiology of Addictive Drugs .....	4
POL 170—Political Psychology .....	4
SOC 126—Social Interaction .....	4
SOC 135—Social Relationships .....	4
SOC 152—Juvenile Delinquency .....	4
SOC 171—Sociology of Violence and Inequality .....	4

**Honors and Honors Program.** In order to be eligible for high or highest honors in Psychology, the student must both meet the college criteria for honors and complete a research project involving a minimum of six units of course work over at least two quarters which represents an original analysis of data on psychological phenomena. Course 194HA-194HB or other approved courses can be used to satisfy the unit requirement. This project is to be written in thesis form and approved by the department. The quality of the thesis work will be the primary determinant for designating high or highest honors at graduation.

**Graduate Study.** The Department offers programs of study and research leading to the Ph.D. degree in psychology. Detailed information regarding graduate study may be obtained on our website.

**Graduate Adviser.** See <http://psychology.ucdavis.edu/graduate>.

**Courses in Psychology (PSC)****Lower Division****1. General Psychology (4)**

Lecture—4 hours. Introduction emphasizing empirical approaches. Focus on perception, cognition, personality and social psychology, and biological aspects of behavior. Only two units allowed to those who have taken course 15 or 16; no credit allowed to those who have taken both courses 15 and 16. GE credit: SocSci | SS.—F, W, S. (F, W, S.) Simonson, Thompson, Traxler

**12Y. Data Visualization in the Social Sciences (4)**

Lecture—2 hours; laboratory—1.5 hours; web virtual lecture—1.5 hours. Introduction to quantitative data across the social sciences (Communications, Political Science, Psychology, Sociology, and other disciplines). Transforming data, describing data, producing graphs, visual reasoning, and interpretations. (Same course as Communications 12Y, Sociology 12Y, Political Science 12Y.) GE credit: QL, VL.—F, W, S. (F, W, S.) Cross

**20. Freshman Psychology Seminar (4)**

Seminar—4 hours. Prerequisite: freshman standing. Instructor will acquaint students with his or her program of research, the development of scientific questions from the literature, and the application of research methods to examine these questions. Critical thinking will be encouraged via expository writing and brief presentations.

**41. Research Methods in Psychology (4)**

Lecture—3 hours; extensive writing. Prerequisite: course 1 or the equivalent; completion of Statistics 13 or 102 strongly recommended. Introduction to experimental design, interviews, questionnaires, field and observational methods, reliability, and statistical inference. GE credit: QL.—F, W, S. (F, W, S.) Cross, Vazire

**41S. Research Methods in Psychology (4)**

Lecture/laboratory—10 hours; web virtual lecture—10 hours. Prerequisite: course 1 or equivalent. Class size limited to 100 students. Introduction to experimental design, interviews, questionnaires, observational research, qualitative approaches, case studies, content analysis, sampling, descriptive statistics,

tics, and statistical inference. Not open for credit to students who have taken course 41. Offered irregularly.

### **90X. Lower Division Seminar (1-2)**

Seminar—1-2 hours. Prerequisite: lower division standing; consent of instructor. Limited enrollment. Examination of a special topic in Psychology through shared readings, discussions, written assignments, or special activities such as fieldwork or laboratory work. May not be repeated for credit. Offered irregularly.

### **98. Directed Group Study (1-5)**

Primarily for lower division students. (P/NP grading only.)

### **99. Special Study for Lower Division Students (1-5)**

(P/NP grading only.)

## **Upper Division**

### **100. Introduction to Cognitive Psychology (4)**

Lecture—4 hours. Prerequisite: courses 1 and 41. Introduction to human information processing, mental representation and transformation, imagery, attention, memory, language processing, concept formation, problem solving, and computer simulation. Not open for credit to students who have completed former course 136.—F, W, S. (F, W, S.) Ekstrom, Ferreira, Henderson, Long, Luck

### **100Y. Introduction to Cognitive Psychology (4)**

Web virtual lecture—4 hours; discussion—1 hour; lecture—1 hour. Prerequisite: courses 1 and 41. Introduction to human information processing, mental representation and transformation, imagery, attention, memory, language processing, concept formation, problem solving, and computer simulation. Not open for credit to students who have completed former course 136 or current course 100.—F, S. (F, S.) Luck

### **101. Introduction to Biological Psychology (4)**

Lecture—4 hours. Prerequisite: courses 1, 41. Pass One open to majors. Survey and integration of the relationships between behavior and biological processes, including physiology, genes, development, ecology, and evolution. Two units of credit for those students who have completed Neurobiology, Physiology and Behavior 100.—F, W, S. (F, W, S.) Krubitzer, Stolzenberg, Trainor

### **103A. Statistical Analysis of Psychological Data (5)**

Lecture—4 hours; laboratory—2 hours; term paper. Prerequisite: course 1, 41 and Statistics 13 or 102. Pass One open to Psychology majors. Design and statistical analysis of psychological investigations and the interpretation of quantitative data in psychology. Not open for credit to students who have completed course 103. GE credit: QL—F, W. (F, W.) Blozis

### **103B. Statistical Analysis of Psychological Data (5)**

Lecture—4 hours; laboratory—2 hours. Prerequisite: course 103A; Statistics 13 or 102. Pass One open to Psychology majors. Probability theory, sampling distributions, statistical inference, and hypothesis testing using standard parametric and correlational approaches. Simple regression analysis, multiple regression analysis, non-parametric statistics, introduction to multivariate statistics, with applications in psychology. Not open for credit to students who have completed course 105. GE credit: QL—F, S. (F, S.) Blozis, Ferrer

### **104. Applied Psychometrics: An Introduction to Measurement Theory (4)**

Lecture—4 hours. Prerequisite: upper division standing in Psychology, courses 41 and 103, Statistics 13. Examination of the basic principles and applications of classical and modern test theory. Topics include test construction, reliability theory, validity theory, factor analysis and latent trait theory. Offered irregularly. GE credit: QL

### **107. Questionnaire and Survey Research Methods (4)**

Lecture/discussion—2 hours; laboratory/discussion—2 hours. Prerequisite: consent of instructor; course 1; course 41 or an equivalent course on social or behavioral research methods. Limited enrollment. Introduction to survey and questionnaire research methods with emphasis on how to ask questions. Social and psychological factors that influence survey response. Practical aspects of fielding survey and questionnaire research. Offered irregularly. GE credit: QL—Herek

### **113. Developmental Psychobiology (4)**

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 101. The biology of behavioral development; survey and integration of the organicistic and environmental processes that regulate the development of behavior.—F, W, S. (F, W, S.) Schank

### **120. Agent-Based Modeling (4)**

Lecture/laboratory—4 hours. Prerequisite: course 100 or 101. Class size limited to 24 students. Introduction to agent-based computer simulation and analysis with emphasis on learning how to model animals, including humans, to achieve insight into social and group behavior. GE credit: QL—S. (S.) Schank

### **121. Physiological Psychology (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 1, 41, 101. Pass One open to Psychology majors. Relationship of brain structure and function to behavior, motivation, emotion, language, and learning in humans and other animals. Methodology of physiological psychology and neuroscience. Not open for credit to students who have completed course 108. (Former course 108.)—F, W, S. (F, W, S.) Bales, Krubitzer

### **122. Advanced Animal Behavior (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 101 or Neurobiology, Physiology, and Behavior 102. Pass One open to Psychology majors. Advanced integrative survey of biological principles of behavioral organization, emphasizing historical roots, current research directions, conceptual issues and controversies. Laboratory exercises on the description and analysis of the behavior of captive and free living animals. (Same course as Neurobiology, Physiology, and Behavior 150.) Not open for credit to students who have completed course 150. (Former course 150.) Offered irregularly.

### **123. Hormones and Behavior (3)**

Lecture—3 hours. Prerequisite: Neurobiology, Physiology, and Behavior 101 and either course 101 or Neurobiology, Physiology, and Behavior 102. Pass One open to Psychology majors. Endocrine physiology with an emphasis on the principles of behavior. Fundamental relationships between hormones and various behaviors engaged in by the organism during its lifetime. Role of hormones in behavioral homeostasis, social behavior, reproductive behavior, parental behavior, adaptation to stress. (Same course as Neurobiology, Physiology, and Behavior 152.) Not open for credit to students who have completed course 152. (Former course 152.)—S. (S.) Bales, Trainor

### **124. Comparative Neuroanatomy (4)**

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 101 or Neurobiology, Physiology, and Behavior 100 or 101. Overview of the neuroanatomy of the nervous system in a variety of mammalian and non-mammalian vertebrates. Examine changes or modifications to neural structures as a result of morphological or behavioral specializations. (Same course as Neurobiology, Physiology, and Behavior 124.) GE credit: SL—W. (W.) Krubitzer, Recanzone

### **125. Behavioral Epigenetics (4)**

Lecture—4 hours. Prerequisite: course 101. Review of basic principles in genetics and epigenetics with emphasis on behavior. Introduction to the use of modern molecular methods in understanding the complex relationships between genes, environment, and behavior.—W, S. (W, S.) Stolzenberg, Trainor

### **126. Health Psychology (4)**

Lecture—4 hours. Prerequisite: course 1, 41, 101. Pass One open to Psychology majors only. Psychological factors influencing health and illness. Topics include stress and coping, personality and health, symptom perception and reporting, heart disease, cancer, compliance, and health maintenance and promotion. Not open for credit to students who have completed former course 160.—W, S. (W, S.) Emmons

### **130. Human Learning and Memory (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1, 41, and either Statistics 13 or 100; or consent of instructor. Consideration of major theories of human learning and memory with critical examination of relevant experimental data.—F, W, S. (F, W, S.) Ranganath, Yonelinas

### **131. Perception (4)**

Lecture—3 hours; independent library work. Prerequisite: courses 1, 41 and 100 or 135. Cognitive organizations related to measurable physical energy changes mediated through sensory channels. Perception of objects, space, motion, events.—F, W, S. (F, W, S.) Geng, Henderson

### **132. Language and Cognition (4)**

Lecture—3 hours; term paper. Prerequisite: courses 1, 41, and either 100 or 135; or consent of instructor. Introduction to the cognitive processes involved in language comprehension and production. Topics include the biological foundations of language, speech perception, word recognition, syntax, reading ability, and pragmatics. GE credit: WE—F, W, S. (F, W, S.) Ferreira, Long, Swaab, Traxler

### **135. Cognitive Neuroscience: The Biological Foundations of the Mind (4)**

Lecture—4 hours;. Prerequisite: course 1, 41, or consent of instructor; course 101, 121, or 129 recommended. Neuroscientific foundations of higher mental processes including attention, memory, language, higher-level perceptual and motor processes, and consciousness. Emphasis on the neural mechanisms which form the substrates of human cognition and the relationship of mind to brain.—F, W, S. (F, W, S.) Ekstrom, Geng, Janata, Mangun, Ranganath

### **136. Psychology of Music (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: courses 1, 41, and either 100 or 135 or Music 6C; or consent of instructor. Introduction to the mental and neural representations of musical structures and processes involved in perceiving, remembering, and performing music. Music and emotion. GE credit: WE—F. (F.) Janata

### **137. Neurobiology of Learning & Memory (4)**

Lecture—4 hours. Prerequisite: courses 1, 41, 101. Overview of the neural basis of learning and memory focusing on modern behavioral neuroscience research with animals. Topics include consolidation, neural plasticity, cellular competition for memory storage, and the role of neurogenesis in learning.—F, S. (F, S.) Wiltgen

### **140. Developmental Psychology (4)**

Lecture—4 hours. Prerequisite: courses 1, 41. Pass One open to Psychology majors. Ontogenetic account of human behavior through adolescence with emphasis on motor skills, mental abilities, motivation, and social interaction. Two units of credit allowed to students who have completed Human Development 100A or 100B. Not open for credit to students who have completed course 112. (Former course 112.)—F, W, S. (F, W, S.) Cross, Ghetti, Goodman, Graf Estes, Lagattuta, Oakes

### **141. Cognitive Development (4)**

Lecture—3 hours; term paper. Prerequisite: Human Development 100A or 100B or course 140. Pass One restricted to Human Development or Psychology majors. Theories, methods, evidence, and debates in the field of cognitive development, such as nature/nurture, constraints on learning, and the role of plasticity. Topics include attention, memory, concepts about the physical and social world, and language.

(Same course as Human Development 101.) GE credit: Wrt | WE.—F, W, S. (F, W, S.) Chen, Cross, Ghetti, Goodman, Graf Estes, Lagattuta, Rivera

#### **142. Social and Personality Development (4)**

Lecture—3 hours; term paper. Prerequisite: Human Development 100A or 100B or course 140. Pass One open to Human Development or Psychology majors. Social and personality development of children, infancy through adolescence. Topics include the development of personality, achievement motivation, self-understanding, sex-role identity, and antisocial behavior. Emphasis on the interface between biological and social factors. (Same course as Human Development 102.) GE credit: SocSci, Wrt | SS, WE.—F, W, S. (F, W, S.) Belsky, Hastings, Thompson

#### **143. Infant Development (4)**

Lecture—3 hours; extensive writing. Prerequisite: courses 1 and 41, and either course 140 or Human Development 100A. Psychological development in infancy. Topics include physical and motor development, sensory and nervous system development, and memory and cognitive development. Emphasis will be on evaluating theories, empirical research, and experimental methods for understanding infant development. GE credit: WE.—F. (F.) Oakes

#### **146. The Development of Memory (4)**

Lecture—3 hours; term paper. Prerequisite: courses 1, 41. Pass One open to Psychology majors. Theory and research on memory development with focus on infancy and childhood. Not open for credit to students who have completed course 133. (Former course 133.) GE credit: WE.—S. (S.) Ghetti, Rivera

#### **148. Developmental Disorders (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: courses 1, 41, and either 140 or 141 or Human Development 100A or 100B. Current scientific knowledge of the influences of biological, cognitive, and environmental factors on the emergence of disorders with onset in childhood. Examples include autism spectrum, ADD/ADHD, dyslexia and dyscalculia. Emphasis placed on understanding these disorders, their causes and their treatments.—F, S. (F, S.) Rivera

#### **151. Social Psychology (4)**

Lecture—4 hours. Prerequisite: courses 1, 41. Pass One open to Psychology majors. Behavior of the individual in the group. Examination of basic psychological processes in social situations, surveying various problems of social interaction; group tensions, norm-development, attitudes, values, public opinion, status. Not open for credit to students who have completed course 145. (Former course 145.)—F, W, S. (F, W, S.) Ledgerwood, Pickett, Sherman

#### **152. Social Cognition (4)**

Lecture—4 hours. Prerequisite: courses 1 and 41. Examines how social factors influence how we attend to, encode, and process information and how these mental processes affect subsequent judgments and behavior.—S. (S.) Pickett, Sherman

#### **153. Psychology and Law (4)**

Prerequisite: courses 1, 41. Prerequisite: courses 1, 41. Pass One open to Psychology majors. Current theoretical and empirical issues in the study of psychology and law. Topics include eyewitness testimony, child abuse, jury decision making, juvenile delinquency and criminology, prediction of violence, insanity defense, and memory for traumatic events. Not open for credit to students who have completed course 115. (Former course 115.) Offered in alternate years.—S. Goodman

#### **154. Psychology of Emotion (4)**

Lecture—4 hours. Prerequisite: course 1, 41. Pass One open to Psychology majors. Introduction to current theories and research on emotion and bodily feelings with special reference to self-knowledge. Not open for credit to students who have completed course 143. (Former course 143.)—F, S. (F, S.)

#### **157. Stereotyping, Prejudice, and Stigma (4)**

Lecture/discussion—4 hours. Prerequisite: courses 1 and 41. Social psychological underpinnings of stereotyping, prejudice, and stigma from sociocultural, motivational, and cognitive perspectives. Topics include: origins, maintenance, change, effects on person perception and memory, and the automaticity/controllability of stereotyping and prejudice. GE credit: DD—W. (W.) Sherman

#### **158. Sexual Orientation and Prejudice (4)**

Lecture/discussion—4 hours. Prerequisite: courses 1, 41. Pass One open to Psychology majors. Current scientific knowledge about sexual orientation and prejudice based on sexual orientation. Emphasis on learning the skills necessary for a critical understanding of science and public policy issues relevant to sexuality. GE credit: SocSci, Div, Wrt | ACGH, DD, SS, WE.—W. (W.) Herek

#### **159. Gender and Human Reproduction (4)**

Lecture—4 hours. Prerequisite: course 1, 41. Pass One open to Psychology majors. Psychology of reproduction. Reproductive events over the course of an individual's life, including sexual development, mate choice, relationships, and reproduction. Biological and social psychological explanations at the levels of mechanism and evolutionary function. Not open for credit to students who have completed former course 149. (Formerly course 149.)—S. (S.) Scheib

#### **161. Psychology of the Self (4)**

Lecture—4 hours. Prerequisite: courses 1 and 41. Psychological theory and research on the self. Topics include: self-knowledge, self-esteem, self-regulation, self-presentation, cognitive and emotional aspects of the self, and the role of the self in shaping social interaction.—F. (F.) Pickett

#### **162. Introduction to Personality Psychology (4)**

Lecture—3 hours; term paper. Prerequisite: course 1, 41. Pass One open to Psychology majors. Scientific study of personality. Methods of personality research. Overview of current research and theory in the field of personality psychology. Not open for credit to students who have completed former course 147. GE credit: SocSci, Wrt | SS.—F, S. (F, S.) Robbins

#### **165. Introduction to Clinical Psychology (4)**

Lecture—4 hours. Prerequisite: courses 1, 41, 168, and either 140 or 151. Major theoretical formulations in the history of clinical psychology, from classical psychoanalysis to contemporary existentialism and behavior modification. A survey, based on lectures, films, and tapes, of what clinical psychologists do, including methods of appraisal, professional roles, and approaches to treatment.—S. (S.) Zane

#### **168. Abnormal Psychology (4)**

Lecture—4 hours. Prerequisite: courses 1, 41. Descriptive and functional account of behavioral disorders, with primary consideration given to neurotic and psychotic behavior. GE credit: SocSci | SS.—F, W, S. (F, W, S.) Schepeler, Zane

#### **170. Psychology of Religion (4)**

Lecture—4 hours. Prerequisite: courses 1 and 41. Major theories, issues, data, and research methodologies of the psychology of religion. Religious experience and expression; religious development in childhood, adolescence, and adulthood; conversion; religious influences on physical and mental health; cross-cultural perspectives. GE credit: Div, Wrt | WE.—S. (S.) Emmons

#### **175. Genius, Creativity, and Leadership (4)**

Lecture—3 hours; term paper. Prerequisite: course 1 and 41 or the equivalent or consent of instructor. The phenomenon of genius examined from a diversity of theoretical, methodological, and disciplinary perspectives, with an emphasis on outstanding creativity and leadership in art, music, literature, philosophy, science, war, and politics. GE credit: SocSci, Wrt | SS, WE.—F, S. (F, S.) Simonton

#### **180A. Research in Cognitive and Perceptual Psychology (4)**

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 41, and four upper division Psychology courses and consent of instructor. Empirical research on selected topics in general experimental psychology (general research design and analysis, perception, cognition, cognitive development, etc.). Specific content will vary from quarter to quarter. May be repeated one time for credit when content differs. Offered irregularly.

#### **180B. Research in Psychobiology (4)**

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 101, three additional upper division courses in Psychology, and consent of instructor. Empirical research on selected topics in psychobiology (animal learning, animal behavior, physiological and sensory psychology, developmental psychobiology, computer modeling of neural systems). Content varies. May be repeated one time for credit when content differs. Offered irregularly.

#### **180C. Research in Personality and Social Psychology (4)**

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 41, and four upper division Psychology courses and consent of instructor. Empirical research on selected topics in personality and social psychology (personality, social psychology, organizational psychology, etc.). Content will vary from quarter to quarter. May be repeated one time for credit when specific content differs. Offered irregularly.

#### **185. History of Psychology (4)**

Lecture—3 hours; term paper. Prerequisite: courses 1, 41, upper division standing or consent of instructor. Pass One open to Psychology majors. Development of psychological thought and research in context of history of philosophy and science. Not open for credit to students who have completed course 120. (Former course 120.) GE credit: SocSci, Wrt | SS, WE.—F. (F.) Simonton

#### **190. Seminar in Psychology (4)**

Seminar—4 hours. Prerequisite: junior or senior standing; major in psychology or consent of instructor. Intensive treatment of a special topic or problem of psychological interest. May be repeated for credit in different subject area.—F, W, S. (F, W, S.)

#### **190X. Upper Division Seminar (1-2)**

Seminar—1-2 hours. Prerequisite: upper division standing and consent of instructor. Limited enrollment. In-depth examination at an upper division level of a special topic in Psychology. Emphasis on student participation in learning. May not be repeated for credit. Offered irregularly.—F, W, S. (F, W, S.)

#### **192. Fieldwork in Psychology (1-6)**

Fieldwork—1-6 hours. Prerequisite: upper division standing in psychology and consent of instructor. Limited enrollment. Supervised internship off and on campus, in community and institutional settings. Maximum of four units may be used towards satisfaction of upper division major requirement. May be repeated one time for credit. (P/NP grading only.)

#### **194HA. Special Study for Honors Students (3)**

Independent study—9 hours. Prerequisite: senior standing in Psychology and qualifications for admission into college honors program, and consent of instructor; at least one course from 180A, 180B, 180C or 199 strongly recommended. Directed research. Supervised reading, research and writing leading to submission of a Senior Honors thesis under the direction of faculty sponsor. (Deferred grading only, pending completion of sequence.) GE credit: WE.—F, W, S. (F, W, S.)

#### **194HB. Special Study for Honors Students (3)**

Independent study—9 hours. Prerequisite: senior standing in Psychology and qualifications for admission into college honors program, and consent of instructor; at least one course from 180A, 180B, 180C or 199 strongly recommended. Directed research. Supervised reading, research and writing leading to submission of a Senior Honors thesis

under the direction of faculty sponsor. (Deferred grading only, pending completion of sequence.) GE credit: WE.—F, W, S. (F, W, S.)

### 197T. Tutoring in Psychology (1-3)

Tutoring—1-3 hours. Prerequisite: upper division standing and consent of instructor. Intended for advanced undergraduate students who will lead discussion sections in Psychology courses. May be repeated for credit for a total of 8 units. (P/NP grading only.)—F, W, S. (F, W, S.)

### 198. Directed Group Study (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S. (F, W, S.)

### 199. Special Study for Advanced Undergraduates (1-5)

(P/NP grading only.)—F, W, S. (F, W, S.)

## Graduate

### 200. Proseminar in Psychology (3)

Seminar—2 hours; independent study—1 hour. Prerequisite: graduate standing in Psychology or consent of instructor. Introduces matriculating graduate students to research activities of departmental faculty. (S/U grading only.)—F. (F.)

### 201. Research Preceptorship (4)

Laboratory—3-4 hours; discussion—3-5 hours. Prerequisite: consent of instructor. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

### 202. Research Seminar (1)

Seminar—1 hour. Prerequisite: graduate standing in psychology. Presentation of graduate research to program faculty and graduate students. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

### 204A. Statistical Analysis of Psychological Experiments (5)

Lecture—4 hours; laboratory—2 hours. Prerequisite: Statistics 102 or equivalent; graduate standing in Psychology or consent of instructor. Probability theory, sampling distributions, statistical inference, and hypothesis testing using standard parametric and correlational approaches. Analysis of variance, factorial and repeated measures, and tests of trends. Not open for credit to students who have completed course 206.—F. (F.) Ferrer

### 204B. Causal Modeling of Correlational Data (5)

Lecture—4 hours; laboratory—2 hours. Prerequisite: course 204A or the equivalent and graduate standing in Psychology or consent of instructor. Examination of how to make causal inferences from correlational data in the behavioral sciences. Emphasis is on testing rival causal models using correlations among observed variables. Beginning with multiple regression analysis, discussion advances to path analysis and related techniques. Not open for credit to students who have completed course 207A.—W. (W.) Simonton

### 204D. Advanced Statistical Inference from Psychological Experiments (5)

Lecture—4 hours; laboratory—2 hours. Prerequisite: course 204A or the equivalent; graduate standing in Psychology or consent of instructor. Advanced topics in statistical inference, which may include probability theory, sampling distributions, statistical inference and hypothesis testing, nonparametric statistics, Bayesian approaches, and advanced issues in analysis of variance. Not open for credit to students who have completed course 205.—S. (S.) Blozis

### 205A. Applied Multivariate Analysis of Psychological Data (4)

Lecture—4 hours. Prerequisite: three courses from 204A, 204B, 204C, 204D or the equivalents, or consent of instructor. Review of the major methods of multivariate data analysis for psychological data. Statistical routines using a linear algebra-based computing language. Topics include multivariate analysis of variance, discriminant analysis, canonical analysis, factor analysis, and component analysis. Not open for credit to students who have completed course 207B. (Former course 207B.) Offered in alternate years.—W. (W.) Ferrer

### 205B. Factor Analysis (4)

Lecture—3 hours; term paper. Prerequisite: graduate standing, course 204A and 204B or equivalents or consent of instructor. Theory and methods of factor analysis, including exploratory factor analysis, confirmatory factor analysis, and principal component analysis. Offered in alternate years.—W. (W.)

### 205C. Structural Equation Modeling (4)

Lecture—3 hours; term paper. Prerequisite: graduate standing; course 204A and 204B or the equivalent or consent of instructor. Theory and methods of structural equation modeling, including path analysis, confirmatory factor analysis, multiple-group modeling and latent growth curve modeling. Offered in alternate years.—Ferrer

### 205D. Multilevel Models (4)

Lecture—4 hours. Prerequisite: course 204A, graduate standing or consent of instructor. Introduction to statistical techniques for the analysis of normal, hierarchically structured data, such as cross-sectional clustered data or repeated-measures data. Topics include hierarchical linear models, latent growth curve models, and how these methods handle unbalanced and/or missing data.—W. (W.) Blozis

### 205E. Applied Psychometrics and Measurement Theory (4)

Lecture—4 hours. Prerequisite: course 204A or equivalent; graduate standing in Psychology or consent of instructor. Examination of the basic principles and applications of classical and modern test theory. Topics include test construction, reliability theory, validity theory, factor analysis, and latent trait theory. Not open for credit to students who have completed course 204 or 204C. Offered in alternate years.—S. (S.)

### 205F. Item Response Theory (4)

Lecture—3 hours; term paper. Prerequisite: course 204A or the equivalent; graduate standing in Psychology or consent of instructor. Item response theory allows for the creation of precise measurement instruments in psychological testing. Review Classical Test Theory, and then cover basic IRT models through advanced applications. Offered in alternate years.—S. (S.)

### 205G. Applied Longitudinal Data Analysis (4)

Lecture—3 hours; term paper. Prerequisite: course 204A and graduate standing in Psychology or consent of instructor. Modeling and understanding of intraindividual change and interindividual differences in change. Reviews conventional methods and introduces contemporary techniques for modeling intraindividual change. Offered in alternate years.—F. (F.) Ferrer

### 206A. Theoretical Foundations: Research Methods in Psychology (4)

Lecture/discussion—3 hours; term paper. Restricted to graduate student status. Examines the philosophy and research practices underlying experimental psychology. Topics to be covered include philosophy of science/epistemology, research design, inference and bias in research, theory development, validity, the social context of research, and critical thinking about research. Offered irregularly.—S. (S.) Pickett, Sherman

### 206B. Research Methods in Psychology: Applications in Social-Personality Research (4)

Lecture/discussion—3 hours; term paper. Restricted to graduate student status. Overview of the research designs, assessment methods, and statistical procedure used by social-personality psychologists. Focus on the practical issues that arise when using each method in specific research contexts. Offered in alternate years.—(W.) Robins

### 207. Survey and Questionnaire Research Methods (4)

Lecture/discussion—4 hours. Prerequisite: completion of a course on social or behavioral research methods, graduate standing. Survey and questionnaire research methods with emphasis on how to ask questions. Cognitive, motivational, and social processes that influence how respondents answer ques-

tions; sampling techniques; Internet resources; practical aspects of fielding survey and questionnaire research. Offered irregularly.—F. Herek

### 208. Physiological Psychology (4)

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. A conceptual analysis of the contributions of neuroanatomy, neurophysiology and neurochemistry to an understanding of animal and human behavior.—S. Bales

### 208A. Fundamentals of Human Electrophysiology (4)

Lecture/discussion—1.5 hours; laboratory—3 hours; extensive problem solving—1.5 hours.; project—3 hours. Prerequisite: consent of instructor. Restricted to 15 students. In-depth introduction and hands-on experience with the event-related potential (ERP) method in the study of attention, executive control, memory, language and social cognitive neuroscience.—W. (W.) Luck, Swaab

### 209A. Introduction to Programming: Matlab (4)

Lecture/laboratory—3 hours. Prerequisite: graduate standing or consent of instructor. The Matlab programming environment as a means of organizing, analyzing, and visualizing scientific data. Basic programming concepts such as variables, loops, conditional branching, and efficient programming techniques will be emphasized. Offered irregularly.—Janata

### 210. Fundamentals of Cognitive Neuroimaging (3)

Lecture/discussion—3 hours. Prerequisite: basic knowledge of inferential statistics and experimental psychology. Introduction to empirical foundations and methodology of neuroimaging, emphasizing pragmatics of functional magnetic resonance imaging (fMRI) to study cognition. Topics include MR physics, the relationship between neural activity and the BOLD response, experimental design, and analysis of fMRI data.—Ranganath

### 211. Advanced Topics in Neuroimaging (2)

Seminar—2 hours. Prerequisite: course 210 or consent of instructor. Restricted to 16 students. Critical presentation and discussion of the most influential advanced issues in neuroimaging, emphasizing fMRI design/analysis and the integration of fMRI with EEG/MEG. (Same course as Neuroscience 211 and Neurobiology, Physiology, and Behavior 211.) (S/U grading only.)—W. (W.) Miller

### 212A. Developmental Psychology: Cognitive and Perceptual Development (4)

Seminar—4 hours. Prerequisite: graduate standing or consent of instructor, completion of undergraduate or graduate course on developmental psychology or human development. Theories and empirical findings concerning human cognitive and perceptual development. Development of perception, memory, concepts (e.g., theory of mind, concepts about number), problem solving, and language from infancy to adolescence.—F. Ghetti, Goodman, Graf Estes, Lagattuta, Rivera

### 212B. Developmental Psychology: Social, Emotional, and Personality Development (4)

Seminar—4 hours. Prerequisite: graduate standing or consent of instructor, completion of an undergraduate or graduate course on developmental psychology or human development. Theories and empirical findings concerning human social, emotional, and personality development. Development of emotions, moral reasoning and behavior, personality, self-concept, and social cognition from infancy to adolescence (may include adulthood).—Thompson

### 217. Behavioral Genetics (4)

Lecture—3 hours; laboratory/discussion—1 hours; term paper. Prerequisite: graduate standing. Restricted to 20 students. Review basic principles in genetics and select topics in molecular genetics with emphasis on behavior. Use of modern molecular methods to outline complex relationships between genes, environment, and behavior. Not open for credit to students who have completed course 251.—W. (W.) Trainor

**218A. Fundamentals of Animal Behavior (5)**

Lecture/discussion—4 hours; discussion—1 hour. Prerequisite: consent of instructor; upper-division undergraduate introduction to the biology of behavior, such as course 101, 122, 123, Neurobiology, Physiology, and Behavior 102, 150, 152, Wildlife, Fish, and Conservation Biology 141, Entomology 104, or Animal Science 105. Survey of the phenomena and theory of animal behavior from the perspectives of multiple biological disciplines, including evolution, ecology, psychology, genetics, neurobiology, endocrinology, and animal science. (Same course as Animal Behavior 218A.)—F. (F.) Sih

**218B. Fundamentals of Animal Behavior (5)**

Lecture/discussion—4 hours; discussion—1 hour. Prerequisite: consent of instructor; course 209A. Survey of the phenomena and theory of animal behavior from the perspectives of multiple biological disciplines, including evolution, ecology, psychology, genetics, neurobiology, endocrinology, and animal science. (Same course as Animal Behavior 218B.)—W. (W.) Sih

**220. History of Psychology (4)**

Lecture—2 hours; seminar—2 hours. Prerequisite: graduate standing in psychology or consent of instructor. A lecture-seminar on the history of psychology and on the applicability of early psychological theory and research to contemporary investigations. Offered in alternate years.—Simonton

**221. Academic Writing in Psychology (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Class size limited to 10 students. Strategies for developing and honing academic writing skills and writing productivity, with a particular focus on how to write a clear and compelling empirical journal article in psychology. May be repeated four times for credit with consent of instructor if student chooses to focus on a substantially different writing project. Offered irregularly.—F. Ledgerwood

**230. Cognitive Psychology (4)**

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Analysis of the mental processes by which knowledge is acquired, manipulated, stored, retrieved and used. Offered in alternate years.—F. Long, Mangun

**231. Sensation and Perception (4)**

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Analysis of the role of sensory processes and perception in experience and their effects on behavior. Offered in alternate years.—S.

**241. Attitudes and Social Influence (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Survey of theory and research in the field of attitudes and social influence. Topics include attitude definition and measurement, major theories of attitude formation and change, the relationship between attitudes and behavior, and recent directions and controversies. Offered irregularly.—Ledgerwood

**243. Social Cognition (4)**

Lecture/discussion—3 hours, term paper. Prerequisite: consent of instructor. Processes underlying the perception, memory, and judgment of social stimuli, the effects of social and affective factors on cognition, and the interpersonal consequences of those processes. Topics include automaticity/control, motivated cognition, person perception, stereotyping, attitudes, and persuasion. Offered irregularly.—Pickett, Sherman

**244. Stereotyping, Prejudice, and Stigma (4)**

Lecture/discussion—3 hours, term paper. Prerequisite: consent of instructor. This course examines the social psychological underpinnings of stereotyping, prejudice, and stigma, including sociocultural, motivational, and cognitive factors. Offered irregularly.—Herek, Sherman

**245. Social Psychology (4)**

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in social psychology.—S. (S.) Pickett, Robins

**247. Personality (4)**

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in human personality.—W. (W.) Robins

**251. Topics in Genetic Correlates of Behavior (4)**

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and experiment in the genetic contributions to animal and human behavior. May be repeated for credit when topic differs. Offered in alternate years.

**252. Topics in Psychobiology (4)**

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Critical study in a selected area of psychobiology. May be repeated for credit when content differs. Offered in alternate years.

**261. Cognitive Neuroscience (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: graduate student standing in Psychology or Neuroscience or consent of instructor. Graduate core course for neuroscience. Neurobiological bases of higher mental function including attention, memory, language. One of three in three-quarter sequence. (Same course as Neuroscience 223.)—S. (S.) Ranganath, Swaab

**263. Topics in Cognitive Psychology (4)**

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Selected topics in language processing, memory, perception, problem solving, and thinking, with an emphasis on the common underlying cognitive processes. May be repeated for credit when content differs. Offered in alternate years.

**264. Topics in Psycholinguistics (4)**

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Discussion of fundamental issues in the psychology of language. May be repeated for credit when content differs. Offered in alternate years.

**270. Topics in Personality and Social Psychology (4)**

Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Critical study of a selected area of personality or social psychology. May be repeated for credit when topic differs.—F. (F.)

**272. Topics in Developmental Psychology (4)**

Seminar—4 hours. Prerequisite: graduate standing in Psychology or consent of instructor. Selected topics in developmental psychology, including developmental neuroscience, memory development, infancy, cognitive development, social development, child maltreatment, children and law, perceptual development, emotional development, children at risk, and adolescence, with emphasis on developmental processes and developmental theory. May be repeated for credit. Offered irregularly.

**289A. Current Research in Psychology (2)**

Seminar—2 hours. Prerequisite: graduate standing in Psychology or consent of instructor. Contemporary theory and empirical research in specialized topics in psychology. Topics include developmental attachment, social neuroscience, mental health, emotion, sexual orientation and identity. May be repeated for credit if topic differs. (Deferred grading only, pending completion of sequence.)

**289B. Current Research in Psychology (2)**

Discussion—2 hours. Prerequisite: course 289A; graduate standing in Psychology or consent of instructor. Intensive examination of contemporary theory and empirical research on a specialized topic in psychology. Sample topics include developmental attachment, social neuroscience, culture and mental health, electrophysiology and cognitive neuroscience, emotion, implicit cognitive processes, sexual

orientation and identity, and attention. May be repeated for credit if content differs. (Deferred grading only, pending completion of sequence.)

**290. Seminar (4)**

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Seminar devoted to a highly specific research topic in any area of basic psychology. Special topic selected for a quarter will vary depending on interests of instructor and students.—F, W, S. (F, W, S.)

**298. Group Study (1-5)**

(S/U grading only.)—F, W, S. (F, W, S.)

**299. Research (2-9)**

(S/U grading only.)—F, W, S. (F, W, S.)

**299D. Dissertation Research (1-12)**

Prerequisite: consent of instructor. (S/U grading only.)

**Professional****390A. The Teaching of Psychology (6)**

Discussion—6 hours; lecture—6 hours; practice—6 hours. Prerequisite: advanced graduate standing in psychology or a closely related discipline and consent of instructor. Methods and problems of teaching psychology at the undergraduate and graduate levels; curriculum design and evaluation. Practical experience in the preparation and presentation of material. (S/U grading only; deferred grading only, pending completion of sequence.)—W, S. (W, S.) Simonton

**390B. The Teaching of Psychology (6)**

Discussion—6 hours; lecture—4 hours; practice—2 hours. Prerequisite: advanced graduate standing in psychology or a closely related discipline and consent of instructor. Methods and problems of teaching psychology at the undergraduate and graduate levels; curriculum design and evaluation. Practical experience in the preparation and presentation of material. (S/U grading only; deferred grading only, pending completion of sequence.)—W, S. (W, S.) Simonton

**396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**Quantitative Biology and Bioinformatics**

(College of Biological Sciences)

The interdisciplinary minor in Quantitative Biology and Bioinformatics is an integrative program that introduces students to the quantitative and computational approaches that are redefining all disciplines in the biological sciences, from molecular and cell biology, through genetics and physiology, to ecology and evolutionary biology. Students in this minor will learn research tools that apply mathematical and computational methods, increase their insight into the strengths and limitations of quantitative approaches, and develop the interdisciplinary perspective that is now the foundation of modern biological research and training.

The minor in Quantitative Biology and Bioinformatics is open to all undergraduates regardless of major and is sponsored by the College of Biological Sciences.

**Minor Program Requirements:**

UNITS

**Quantitative Biology and Bioinformatics ..... 18-24**

Core Courses .....	8-12
Programming: Computer Science	
Engineering 10 or 30 or the equivalent* .....	4
Quantitative Biology: Biological Sciences 132 or Mathematics 124 .....	4
Bioinformatics: Computer Science Engineering 124 or 129 .....	4

Quantitative and Computational Preparation.....	4
Complete one course from the following:	
Applied Science Engineering 115;	
Biomedical Engineering 105; Computer Science Engineering 122, 130;	
Mathematics 128A, 128B, 128C, 135A;	
Statistics 130A, 131A, 141A	
*The programming requirement may be satisfied by previous experience and therefore may not entail college course credit. Please see your minor adviser for this determination and its possible impact on your unit requirements for the minor.	
Restricted Electives.....	6-8
Complete two or more courses from the following list to achieve a total of 18-24 units: Biological Sciences 134, 180L, 181, 183; Biomedical Engineering 102, 117, 140, 141, 151; Biotechnology 150; Computer Science Engineering 165A, 166; Evolution and Ecology 102, 103, 104, 175; Microbiology 105; Molecular and Cellular Biology 123, 143, 182; Neurobiology, Physiology, and Behavior 166, 167; one course from: Environmental Science and Policy 121 or Wildlife, Fish, and Conservation Biology 122	

**Restrictions.** No more than two upper division courses from a single department may be offered in satisfaction of the minor requirements. Only one course used to satisfy a requirement for the minor may be applied toward a student's major.

**Minor Adviser.** Consult the Biology Academic Success Center (BASC), 1023 Sciences Laboratory Building; 530-752-0410; <http://basc.ucdavis.edu/>

## Radiation Oncology

See Medicine, School of, on page 427.

## Radiology

See Medicine, School of, on page 427.

## Range Science

(College of Agricultural and Environmental Sciences)

**Faculty.** See Plant Sciences, on page 514.

**Related Program.** See Ecological Management and Restoration, on page 250.

**Related Courses.** See Plant Sciences 101, 112, 130, 131, 135; Nutrition 115; Soil Science 105, 120; Wildlife, Fish, and Conservation Biology 151.

## Religious Studies

(College of Letters and Science)

Archana Venkatesan, Ph.D., Chair

**Program Office.** 213 Sproul Hall  
530-752-1219; <http://religions.ucdavis.edu>

### Faculty

Allison Coudert, Ph.D., Professor	
Mark Elmore, Ph.D., Assistant Professor	
Naomi Janowitz, Ph.D., Professor	
Meaghan O'Keefe, Ph.D., Assistant Professor	
W. Flagg Miller, Ph.D., Professor	
Eva Mroczek, Ph.D., Assistant Professor	
Seth Sanders, Ph.D., Professor	
Mairaj U. Syed, Ph.D., Assistant Professor	
Archana Venkatesan, Ph.D., Associate Professor	
Keith Watengaugh, Ph.D., Professor	

### Emeriti Faculty

Whalen W. Lai, Ph.D., Professor Emeritus

### The Major Program

Religion is a major force in human experience. It has shaped the world's history, literature, art, culture, politics, ethics, and economics. In addition to offering courses in all the major religious traditions (Judaism, Christianity, Islam, and Hinduism), the Religious Studies Program has developed cross-cultural courses dealing with religious symbols, myths, and rituals in written texts, art, theater, and film, and the Internet, as well as, thematic courses dealing with such topics as religion and the body, the rise of fundamentalism, religion and science, religion and ethics, and religion and violence.

**The Program.** The major introduces students to the academic study of religion. Students can choose from a broad range of courses both in the program itself and in other departments and programs-history, philosophy, psychology, sociology, anthropology, American studies, classics, and medieval studies. In addition to studying religious thought per se, students in the major can also study the way religion has shaped human behavior in such matters as family life, gender roles, ethics, artistic life, concepts of individual freedom, the pursuit of science, and economics. For some students, Religious Studies is an appropriate second major and combines well with anything from philosophy to international agricultural development, political science, and the physical sciences.

**Career Alternatives.** Because of the program's focus on developing critical thinking, writing, and reading skills, students who major in Religious Studies are well prepared to enter a variety of careers, including teaching, the health professions, law, business, and government. In an increasingly global society, knowledge of the world's religious traditions and practices has become an essential part of a student's education.

### A.B. Major Requirements:

UNITS

#### Preparatory Subject Matter..... 20

(A) One course from the Religious Studies 1 series .....	4
(B) Four courses from other Religious Studies lower division offerings .....	16

#### Depth Subject Matter ..... 40

Religious Studies 100 .....	4
Nine upper division Religious Studies courses* .....	36
* Four of these courses may be upper division courses related to religion that are offered by other departments and taken with the approval of a Religious Studies adviser.	

#### Total Units for the Major ..... 60

**Recommended.** A reading knowledge of a foreign language is highly recommended.

**Course Equivalents.** The major advisers have a list of lower and upper division courses that can be substituted for courses suggested above.

**Major Advisers.** Consult the Program office.

### Minor Program Requirements:

UNITS

#### Religious Studies ..... 20

Lower division course.....	4
Upper division courses.....	16
Religious Studies 100 required. Some substitutions from other departments or programs allowed with consent of adviser.	

**Minor Advisers.** Same as major advisers.

**Honors and Honors Program.** A student becomes eligible for graduation with honors by meeting the minimum GPA and course requirements established by the College of Letters and Science. Upon successful completion of the additional requirements of the College of Letters and Science Honors Program, individual students may be recommended

by the program for graduation with high honors or highest honors on the basis of an evaluation of their academic achievements in the major.

### Education Abroad Program.

The Religious Studies program encourages students to study in the Summer Abroad program, the Quarter Abroad program, or the Education Abroad program. With the approval of a major adviser, applicable courses taken abroad may be accepted in the major or minor programs.

### Teaching Credential Subject Representative.

See the Teaching Credential/M.A. Program on page 124.

**Hebrew.** Students interested in Hebrew courses should see <http://classics.ucdavis.edu/hebrew>.

**Human Rights Minor.** Students interested in the Human Rights minor should see <http://humanrightsminor.ucdavis.edu>.

**Jewish Studies.** Students interested in Jewish Studies should see <http://jewishstudies.ucdavis.edu>.

### Courses in Religious Studies (RST)

#### Lower Division

##### 1. Survey of Religion (4)

Lecture—3 hours; discussion—1 hour. Basic concepts introduced through readings of the primary religious literature. Discussion of central ideas (creation, history, law, prophecy, suffering, mysticism, asceticism, karma, reincarnation, moksha, etc.); readings from the Bible, Bhagavad Gita, the Koran, selections from Plato and early Buddhist writings. GE credit: ArtHum, Div, Wrt | ACGH, AH, DD, OL, VL, WE.

##### 1A. Pilgrimage (4)

Lecture—3 hours; discussion—1 hour. Introduction to comparative religion, focusing on the theme of pilgrimage in different religious traditions. Not open to students who have taken course 3A. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

##### 1B. Death and Afterlife (4)

Lecture—3 hours; discussion—1 hour. Introduction to comparative religion, focusing on the theme of death and the afterlife in different religious traditions. Not open to students who have taken course 3B. GE credit: ArtHum, Div, Wrt | AH, OL, VL, WC, WE.

##### 1C. Sacrifice (4)

Lecture—3 hours; discussion—1 hour. Introduction to comparative religion, focusing on the theme of sacrifice in different religious traditions. Not available to those who have taken course 3C. GE credit: ArtHum, Div, Wrt | AH, OL, VL, WC, WE.—Coudert

##### 1D. Conversion (4)

Lecture—3 hours; discussion—1 hour. Introduction to comparative religion, focusing on the theme of conversion in different religious traditions. Not available to those who have taken course 3D. Offered irregularly. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

##### 1E. Fundamentalism (4)

Lecture—3 hours; discussion—1 hour. Introduction to comparative religion, focusing on the idea of fundamentalism in different religious traditions. Not available to those who have taken course 3E. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, OL, VL, WE.—Miller, Watengaugh

##### 1F. Religion Today (4)

Lecture—3 hours; discussion—1 hour. Introduction to comparative religion, focusing on different religious traditions in the contemporary world. GE credit: ArtHum, Div, Wrt | AH, DD, WC, WE.—Miller

##### 1G. Myth, Ritual, and Symbolism (4)

Lecture—3 hours; discussion—1 hour. Myths, rituals and religious symbols found in a variety of religious traditions including examples from ancient and contemporary religious life. Variety of religious phenomena; validity of different approaches to the study of religion. Not open to students who have taken and received unit credit for course 2. GE credit: ArtHum, Div, Wrt | AH, OL, VL, WC, WE.—F. W. (F. W.) Janowitz

**1H. Sex, Marriage, and Divorce in Medieval and Modern Society (4)**

Lecture—3 hours; discussion—1 hour. Methods used in the study of religion, focusing on a particular theme in a number of religious traditions. GE credit: ArtHum | AH, OL, WC, WE.—Syed

**1J. Music, Voice, and the Word (4)**

Lecture—3 hours; discussion—1 hour. Exploration of relation between religion and musical traditions in various cultures. Investigation of ways music, vocal performance and sound production reflect and shape modern religious sensibilities. Special attention to gender, ethnicity, race, class, nationalism, secularism and mass media. GE credit: ArtHum | AH, WC.—Venkatesan

**10. Contemporary Ethical Issues (2)**

Lecture—2 hours. Presents challenging, contemporary ethical issues from a multicultural perspective. Rotating topics will include Ethical Eating, Capital Punishment, Euthanasia, Poverty, and Animal Rights. May be repeated for credit. GE credit: ArtHum, Wrt | AH, WE.—Coudert, Janowitz, O'Keefe

**10A. Contemporary Ethical Issues (2)**

Discussion—1 hour; extensive writing. Prerequisite: Concurrent enrollment in course 10 required; GE topical breadth and diversity credit only with concurrent enrollment in course 10. Restricted to students enrolled in course 10. Discussion of the readings assigned for course 10 and completion of a major research paper. May be repeated for credit. GE credit: ArtHum, Div, Wrt | AH, WE.—Coudert, Janowitz, O'Keefe

**11. Ethical Eating (4)**

Lecture—3 hours; term paper or discussion—1 hour. Introduction to the complex and varied ethical, religious, and cultural meanings that food has had across the centuries and globe. GE credit: ArtHum, Div, Wrt | AH, OL, VL, WC, WE.—Coudert

**12. The Emergence of Judaism, Christianity and Islam (4)**

Lecture—3 hours; discussion—1 hour. History of religion in the ancient Near East and Mediterranean, from the Persian period through the rise of Islam. Emphasis on historical and social contexts of the formation of new traditions, in particular Judaism, Christianity, and Islam. GE credit: ArtHum, Div, Wrt | AH, OL, WC, WE.

**15Y. Reading War/Fighting War (4)**

Lecture—2 hours; web electronic discussion—1 hour; extensive writing. Introduction to both classic religious texts about war and a set of actual scenarios drawn from the experience and training of soldiers in recent military conflicts. GE credit: ArtHum, Div, Wrt | ACDH, AH, DD, OL, VL, WC, WE.—Janowitz

**21. Hebrew Scriptures (4)**

Lecture—3 hours; term paper or discussion. Selected texts from the Hebrew Scriptures (Genesis II Chronicles) and review of modern scholarship on the texts from a variety of perspectives (historical, literary, sociological, psychological). Course work is based on an English translation and no knowledge of Hebrew is required. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

**23. Introduction to Judaism (4)**

Lecture/discussion—3 hours; term paper. Introduction to the study of religion using examples from the rituals, art and holy texts of Judaism. No prior knowledge of either Judaism or the study of religion is necessary. GE credit: ArtHum, Div, Wrt | ACGH, AH, DD, WC, WE.

**30. Religions of South Asia (4)**

Lecture—3 hours; discussion—1 hour. Introduction to South Asian religions, including Hinduism, Buddhism, Islam, Jainism and Sikhism. Traces historical developments from Vedic texts and their ascetic reformulation by sages such as Yajnavalkya, Siddhartha Gautama, and Mahavira into our global present. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.—Elmore, Venkatesan

**40. New Testament (4)**

Lecture—3 hours; discussion—1 hour. New Testament literature from critical, historical, and theological perspectives. GE credit: ArtHum, Wrt | AH, WC, WE.

**42. Religion and Science Fiction (4)**

Lecture—3 hours; term paper. Representations of actual and fictional religious movements in science fiction and fantasy writing and film. Examination of: the characteristics of religion and religiosity in fictional religious movements; the relationship between religion, science, and technology in modern speculative fiction. GE credit: ArtHum, Div, Wrt | AH, VL, WE.

**45. Christianity (4)**

Lecture/discussion—3 hours; term paper or discussion. Major concepts and practices in the Christian tradition. Survey of the history of Christianity and Christian expansion from antiquity to modern times. Course pays particular attention to Christianity in China, India, Africa, the Middle East, and Latin America. GE credit: ArtHum | AH, VL, WC, WE.

**60. Introduction to Islam (4)**

Lecture/discussion—3 hours; term paper or discussion—1 hour. Introduction to topics central to the Islamic tradition. Muhammad, the Qur'an, Islamic law, theology, philosophy, cosmology, worship, and mysticism. Race and gender in Islam, Islamic revival, and varying experiences of Islam in different historical and cultural settings. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, VL, WC, WE.—Syed

**65C. The Qur'an and Its Interpretation (4)**

Lecture/discussion—3 hours; extensive writing. The Qur'an, its history, its various functions in the lives of Muslims, and its different interpretations. Quranic themes such as God and humankind, nature and revelation, eschatology and Satan. Islam and other religions; women, gender, and sexuality. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Syed

**67. Modern Hinduism (4)**

Lecture—3 hours; term paper. Historical survey of modern Hinduism from the early nineteenth century to the present. Topics include Rammohun Roy, Sir William Jones, and Mahatma Gandhi, nationalism, post-colonialism and diasporic religion. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, VL, WC, WE.—Elmore, Venkatesan

**68. Hinduism (4)**

Lecture—3 hours; writing. Hindu tradition from ancient to modern times. Multiplicity of religious forms within Hinduism with mention of Jainism, Buddhism, and Sikhism and their relation to the mainstream of Hindu religion. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.—Elmore, Venkatesan

**69. Introduction to Hindu Mythology (4)**

Lecture/discussion—3 hours; term paper or discussion—1 hour. Survey of the major narrative traditions within Hinduism, including epic literature and local stories in oral, textual, visual and performative forms. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.—Venkatesan

**70. Religion and Language (4)**

Lecture/discussion—3 hours; term paper. Basic toolkit for studying religious discourse in a variety of traditions. Concentration on the sacred and profane, the wondrous and ordinary, and the mystical and reasonable. Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Miller, O'Keefe

**75. Introduction to Chinese Philosophy (4)**

Lecture/discussion—4 hours. Introduction to Chinese philosophy from classical pre-modern times; emphasis on basic concepts and their impact on social conduct; the Age of Philosophers, the Han synthesis, the medieval Buddhist contribution.

**80. Religion, Gender, Sexuality (4)**

Lecture/discussion—3 hours; term paper. Constructions of gender and sexuality within one or more religious traditions, pre-modern and modern. Emphasis on the interaction between religious, medical, and ethical definitions of the human body and sexual behavior. GE credit: ArtHum, Div, Wrt | AH, WE.—Coudert

**98. Directed Group Study (1-5)**

Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.)—F, W, S. (F, W, S.)

**99. Special Study for Lower Division Undergraduates (1-5)**

(P/NP grading only.)—F, W, S. (F, W, S.)

**Upper Division****100. Study of Religion: Issues and Methods (4)**

Lecture—3 hours; term paper. Principal issues and methods of Religious Studies and associated fields. GE credit: ArtHum or SocSci | AH or SS, WC, WE.—Janowitz

**102. Christian Origins (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Development of Christianity from the end of the first century through the major controversies of the fifth century. Emphasis on the relationship between the new religious movement and the Roman Empire, and issues of early Christian identity and diversity. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

**103. Medieval and Byzantine Christianity (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Christianity in Europe and the Near East from the year 600 to 1450. Focus on the development of Catholic and Orthodox traditions in ritual, art, and thought, with attention to interactions between regional groups, and Christian interaction with Islam. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

**104. Christianity 1450-1700 (4)**

Lecture/discussion—3 hours; term paper. History of Reformation conflicts over the authority of scripture, the nature of man and the universe, and the basis of morality with the goal of understanding how these conflicts laid the foundation for the modern world. GE credit: ArtHum, Div, Wrt.—Coudert

**105. Christianity and Modernity, 1700-1920 (4)**

Lecture—3 hours; term paper. Reaction of Christian critics and apologists to the profound cultural and scientific transformations resulting from the Scientific Revolution, the Enlightenment, and the advent of the modern critical study of religion. Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, OL, VL, WC, WE.—Coudert

**106. Christianity in the Contemporary World (4)**

Lecture—3 hours; term paper. Christianity in the 20th and 21st centuries. Relationship of Christianity to globalization, industrialization, mass media, and the contemporary secular state. Focus on Christianity in America and developing nations, and on the relationship of established Christian institutions to new Christian movements. GE credit: ArtHum, Div, Wrt | ACGH, AH, WC, WE.—Coudert, O'Keefe

**110. Life, Meaning and Identity (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing. Study of religious lives, the quest for meaning and for personal identity; how religions frame the problems of life; how cultural and personal crises affect youthful identity; the nature and structure of dreams, myths, and ideals. GE credit: AH, WE.—Elmore, Janowitz

**111. Persuasion and Conviction in Religious Tradition (4)**

Lecture/discussion—4 hours; term paper. Selected topics in religious argument. Familiarizes students with the discourse structures of religious persuasion and enables them to perform analysis of such texts. Covers argument styles and structures used in ethics, theology, and preaching. GE credit: ArtHum | ACGH, AH, OL, WC, WE.—Miller, O'Keefe, Syed

**115. Mysticism (4)**

Lecture—3 hours; term paper. Prerequisite: one lower division Religious Studies course. Historical and descriptive analysis of selected key figures in

mystical traditions and readings of representative mystical texts. Analytic term paper. GE credit: ArtHum, Div, Wrt | AH, OL, VL, WC, WE.

#### **120. Religion, Magic and Science (4)**

Lecture—3 hours; extensive writing. Religion, magic, and science from the middle ages to the present. Contrast between modern scientific methodology and religious and magical thinking. (Same course as Science and Technology Studies 120.) GE credit: ArtHum, Div, Wrt | AH, OL, VL, WC, WE.—Coudert

#### **122. Studies in Biblical Texts (4)**

Lecture—3 hours; term paper. Prerequisite: course 21. Study of a book from the Prophets or writings from critical, historical, and religious perspectives. May be repeated one time for credit in different subject area. GE credit: ArtHum | AH, WE.—Janowitz

#### **124. Topics in Judaism (4)**

Lecture—3 hours; term paper. Prerequisite: course 21, 23. Examination of selected aspects of Jewish life, religion, or literature. Potential topics include: Jewish Perspectives on Jesus; The Golem: History and Legend; Sexuality and Gender in Late Antique Judaism and Early Christianity. May be repeated for credit when topic differs.—Janowitz

#### **125. Dead Sea Scrolls, Apocrypha, and Pseudepigrapha (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 21 or consent of instructor. Survey of the Dead Sea Scrolls, apocryphal and pseudepigraphical writings of Judaism and Christianity and their historical, social, and religious importance. GE credit: ArtHum, Wrt | AH, WC, WE.—Janowitz

#### **126. The Formation of the Rabbinic Tradition (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: courses 21, 23, 40 or 125. Survey of the classical rabbinic Jewish texts such as the Talmud and of the social and historical contexts of their production in Palestine and Babylonia. GE credit: Wrt | WC.

#### **130. Topics in Religious Studies (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: one from course 1, 2, 3A, 3B, or 3C or consent of instructor. Thematic study of a phenomenon in more than one religious tradition or of the relationship between religion and another cultural phenomenon. Topics may include archeology and the Bible, women and religion, religion and violence. May be repeated for credit when topic differs. GE credit: WC, WE.

#### **131. Genocide (4)**

Lecture/discussion—3 hours; term paper or discussion—1 hour. Prerequisite: upper division standing. Comparative and critical study of the modern phenomenon of genocide from religious, ethical and historical perspectives. (Same course as Human Rights 131.) GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, VL, WC, WE.—W. (W.) Watenpaugh

#### **132. Topics in Mediterranean Ancient Religion (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 21, 40 or consent of instructor. Thematic study of specific sociological, literary or theological theme across the religious traditions of the ancient Mediterranean/Near East: Greek and Roman religions, Judaism, Christianity, Zoroastrianism, Manichaeism, etc. Topics may include creation, sacrifice, priesthoods, prophecies, holy books, the afterlife. May be repeated two times for credit when topic differs. GE credit: ArtHum | AH, WC, WE.

#### **134. Human Rights (4)**

Lecture/discussion—3 hours; term paper or discussion—1 hour. Introduction to the interdisciplinary study of the origins, evolution, denial and protection of Human Rights. No credit for students who have completed Religious Studies 90. (Same course as Human Rights 134.) GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, WC, WE.—F. (F.) Watenpaugh

#### **135. The Bible and Film (4)**

Lecture—2 hours; term paper; film-viewing—3 hours. Prerequisite: Humanities 10 recommended. Examination of the uses of the Judeo-Christian scrip-

tures in film. Topics include dramatic depictions of biblical stories, the tension between science and religion, allegorical treatments of biblical themes, and the problems of religious conviction.

#### **138. Human Rights, Gender, and Sexuality (4)**

Lecture/discussion—3 hours; term paper. Gender and sexuality in the context of human rights. Topics include women's participation in the public sphere, the right to change gender, the right for family privacy, and the right to marriage. (Same course as Human Rights 138.) GE credit: ArtHum | AH, WC, WE.—F, W, S, Su. (F, W, S, Su.) O'Keefe

#### **140. Christian Theology (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Historical and systematic introduction to Christian doctrine, with attention to divergent traditions and the problem of orthodoxy and heresy. GE credit: ArtHum | AH, WC, WE.

#### **141A. New Testament Literature: Synoptic Gospels (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Life and thought of the early Church as reflected by the Synoptic Tradition—Matthew, Mark, Luke and Acts. Offered every third year to alternate with 141B, 141C. GE credit: ArtHum, Wrt | AH, WC, WE.

#### **141B. New Testament Literature: John (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Life and thought of the early Church as reflected by the Johannine Tradition; the Gospel and letters of John. Offered every third year to alternate with courses 141A and 141C. GE credit: ArtHum, Wrt | AH, WC, WE.

#### **141C. New Testament Literature: Paul (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Life and thought of the early Church as reflected by the Pauline tradition—the letters of Paul. Offered every third year to alternate with 141A, 141B. GE credit: ArtHum, Wrt | AH, WC, WE.

#### **143. New Testament Apocrypha (4)**

Lecture—3 hours; term paper. Prerequisite: consent of instructor. Extra-canonical Christian writings and their reception, from antiquity to the present. Emphasis on the importance of New Testament figures both as literary characters and as authors within different Christian traditions. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

#### **144. History of the Bible (4)**

Lecture—3 hours; term paper. Prerequisite: course 21 or 40. History of the formation of the Christian biblical canon, with emphasis on differences between Christian traditions; survey of translations and adaptations of biblical narrative in Christianity, Judaism, and Islam, as well as in contemporary culture. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

#### **145. Contemporary American Religion (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 40 and History 17B recommended. Examination of several major movements and phenomena in twentieth-century American religion. GE credit: ArtHum | ACGH, AH, DD, WE.

#### **150. Religious Ethics (4)**

Lecture/discussion—3 hours; term paper or discussion. Prerequisite: course 10 recommended. Study of the religious bases of ethics through examination of ethical problems that arise in different religious cultures around the world and in nations where multiple religious cultures face similar issues. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—O'Keefe, Syed

#### **154. The Hindu Temple (4)**

Lecture—3 hours; term paper. Comparative history of architecture and symbolism of the Hindu Temple in India, Southeast Asia and the United States. Attention to the temple as expression of religious knowledge, political authority, and cultural heritage through the lens of colonialism and postcolonialism. (Same course as Art History 154.) GE credit: ArtHum or SocSci | AH or SS, VL, WC, WE.—Venkatesan

#### **156. Religion and the Performing Arts in India (4)**

Lecture—3 hours; term paper. Prerequisite: course 30, 68, or consent of the instructor. Survey of religion and performing arts in India. Emphasis on the influence of colonialism, nationalism, and regionalism on the history of Indian performing arts. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Venkatesan

#### **157. Hindu Women and Goddesses (4)**

Lecture—3 hours; term paper. Prerequisite: course 10 recommended. Hindu goddesses and the religious lives of Hindu women in India and the diaspora. GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.—Venkatesan

#### **158. The Ramayana (4)**

Lecture—3 hours; term paper. Exploration of the Indian epic, Ramayana, through the lens of literature, performance, and visual art. Emphasis on the text's diversity and its contemporary global relevance. Topics include Ramayanas in Southeast Asia, and in various South Asian diaspora communities. (Same course as Comparative Literature 156.) GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Venkatesan

#### **160. Introduction to Islamic Thought (4)**

Lecture—3 hours; extensive writing. Prerequisite: course 60 recommended. The development of Islamic thought from the first centuries of Islam to the eighteenth century. Theology, philosophy, ethics, Sufism, historiography, political theory, fundamentalism, al-Farabi, al-Ghazzali, Ibn Rushd, Tusi, Ibn al-Arabi, Rumi, Molla Sadra, Ibn Khaldun, Ibn Abd al-Wahhab. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH, WC, WE.—Syed

#### **161. Modern Islam (4)**

Lecture/discussion—3 hours; term paper. The response of Islam to modernity: secularism, reformism, fundamentalism. Islam and imperialism, women, media and immigration. Islamic modernism, political Islam, Islam in Europe and America. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Miller, Watenpaugh

#### **161B. Modern Islam: Authority and Tradition In Process (4)**

Lecture/discussion—3 hours; term paper. Survey of Islamic thought, social organization, politics from eighteenth century through present. Focus on changing notations of moral authority and tradition. Concentration on Middle East and South Asia with sustained treatment of North American engagements with the Islamic world. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, OL, WC, WE.—Miller

#### **162. Introduction to Islamic Law (4)**

Lecture—3 hours; extensive writing. Prerequisite: course 60 recommended. The development of Islamic law in the formative centuries of Islam, ca. 600-1000, as well as its adaptation to changing economic, social, and political conditions in subsequent periods. Legal schools, legal theory, the Shari'a, reformist movements, human rights. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt | AH, WC, WE.—Syed

#### **163. The Social Life of Islam (4)**

Lecture—3 hours; term paper. Prerequisite: course 60 or History 6 recommended. Introduction to culture and social life in Muslim societies. Focus on the plurality of traditions in Muslim faith, reason, and everyday practice. Special attention to Muslim rituals, ethical values, verbal genres, family life, sexuality and veiling, and youth culture. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, OL, WC, WE.—Miller

#### **165. Islam in Asia (4)**

Lecture/discussion—3 hours; extensive writing. Islam as a lived religion in the Indian sub-continent, Central Asia, China, and Southeast Asia. Emphasis is on primary sources studied comparatively and historically. GE credit: ArtHum, Div, Wrt.

**166. Religion and Media in Arab World (4)**

Lecture—4 hours. Exploration of the role and experience of media technologies in the Arab world. Study of digital and electronic media as well as alternative media practices. Investigation of new trends in political activism and identity formation. (Same course as Middle East/South Asian Studies 131C.) GE credit: SocSci | OL, SS, VL, WC, WE.—Miller

**167. Iraq (4)**

Seminar—3 hours; term paper. Origins, causes and ethical challenges of conditions in Iraq; larger historical, cultural and ethical dimensions of mass violence, war, liberation, neocolonialism, terrorism and resistance.—Watenpaugh

**170. Buddhism (4)**

Lecture—3 hours; term paper. Buddhism in its pan-Asian manifestations, from its beginning in India to its development in Sri Lanka and Southeast Asia, Central Asia, China and Japan; teachings and practices, socio-political and cultural impact. GE credit: ArtHum | AH, VL, WC.—Elmore

**172. Ch'an (Zen) Buddhism (4)**

Lecture/discussion—3 hours; term paper. Doctrines and methods of the Ch'an Buddhism, both ancient and modern. Review of ritual techniques, including meditation.

**175A. Chinese Intellectual Traditions: Daoist Traditions (4)**

Lecture/discussion—4 hours. Prerequisite: a course in Chinese history recommended. English-language survey of key Daoist texts and scholarship. Topics include Daoist concepts of the cosmos, the natural world, scripture, the body, and immortality; Daoist divinities; Daoism and the state. (Same course as Chinese 100A) GE credit: ArtHum, Div, Wrt | AH, WC.—Halperin

**189. Senior Colloquium (4)**

Seminar—3 hours; term paper. Prerequisite: consent of instructor. Primarily for seniors in Religious Studies. Discussion in depth of a problem in religion which requires the methods of several disciplines and is important in the encounter between religions.

**190. Seminar (4)**

Seminar—3 hours; term paper. Prerequisite: consent of instructor; required of all Religious Studies majors. Allows majors to integrate their disciplined study of the field. Emphasis on current scholarly debate about the methods for analyzing and comparing diverse religious traditions.

**194HA. Special Study for Honors Students (1-5)**

Independent study. Prerequisite: consent of instructor. Open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member approved by the Program Director, leading to a senior honors thesis on a religious studies topic. (P/NP grading only.)

**194HB. Special Study for Honors Students (1-5)**

Independent study. Prerequisite: consent of instructor. Open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member approved by the Program Director, leading to a senior honors thesis on a religious studies topic. (P/NP grading only.)

**198. Directed Group Study (1-5)**

Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.)

**Graduate****201. Methods and Issues in Religious Studies (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Focuses on controversies in the study of comparative religion. How is religion best defined? Are there methods unique to the study of religion? What does the study of religion contribute to the

study of society in general? May be repeated two times for credit when topic differs.—Coudert, Sanders

**205. Religion and Media (4)**

Lecture/discussion—3 hours; term paper. Many communities are finding global media technologies useful for religious practice. This course examines how religious revitalization is historically situated. A phenomenological approach will enable students to situate media and religion within the social and material world of practitioners.—Miller

**210. Religion and Postcoloniality, or Savages, Civilization, and Spirituality (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. This course examines relations between religion and colonialisms. Using specific historical situations it explores some of our thorniest theoretical problems. Students acquire a solid understanding of postcolonial theory and the historical tools to critically engage religion in the present.—Elmore

**212. Religion and Violence (4)**

Seminar—3 hours; term paper. Comparative and critical study of the ideological, cultural, and theological relationship between forms of violence and religion and religious practice.—Watenpaugh

**215. Topics in the History of Christianity (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Selected topics in the history of Christianity. Intended for graduate students seeking to do advanced work in the study of Christianity. May cover issues in Christian thought from antiquity, the middle ages, the early modern or modern period. May be repeated for credit when topic differs.—Coudert

**299. Directed Research (1-12)**

(S/U grading only.)

**Professional****396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## Russian

(College of Letters and Science)

Jaimey Fisher, Ph.D., Chairperson of the Department

**Program Office.** 213 Sproul Hall  
530-752-1219; <http://russian.ucdavis.edu>

**Committee in Charge**

Carlee Arnett, Ph.D. (*German and Russian*)  
Jenny Kaminer, Ph.D. (*German and Russian*)  
Elisabeth Krimmer, Ph.D. (*German and Russian*)  
Olga Stuchebrukhov, Ph.D. (*German and Russian*)

**Faculty**

Jenny Kaminer, Ph.D. (*German and Russian*)  
Olga Stuchebrukhov, Ph.D. (*German and Russian*)

**Affiliated Faculty**

James Gallant, Ph.D., Lecturer Emeritus  
Daniel Rancour-Laferriere, Ph.D., Professor Emeritus  
Valerie A. Tumins, Ph.D., Professor Emerita

**Emeriti Faculty**

Liliana Avramenko, Lecturer

**The Major Program**

The Russian major introduces students to a culture rich in art, music, theater, film, language, and literature. The major offers an opportunity to learn skills needed to enter the fields of foreign affairs, world politics, and international trade, or to begin graduate work in literature, history, cultural studies and international relations.

**The Program.** The major program instructs students in speaking, understanding, reading, and writing the Russian language. The program also acquaints students with the intellectual and cultural

contributions of the Russian world through the study of its literature, traditions, and institutions.

**Internships and Career Alternatives.** Russian majors may participate in internships where they can serve as translators and interpreters for schools and business firms throughout Northern California. Upon graduation, many Russian majors enter the business world or enter graduate programs in Slavic studies and international relations. The program encourages students to supplement their Russian studies with courses in related fields such as international relations, political science, computer science, cultural studies, or economics in order to maximize their career possibilities.

**A. B. Major Requirements:**

UNITS

**Preparatory Subject Matter .....** **0-27**

Russian 1-6; or the equivalent ..... 0-27

**Depth Subject Matter .....** **36**

Russian 101A, 101B, 101C ..... 12

Russian 102 or 103 or 104 or 105 ..... 4

Additional upper division units chosen in consultation with adviser from the following selection of Literature and Culture courses taught in Russian and English ..... 20

Russian 122, 124, 126, 127, 129, 130,

133, 139, 140, 141, 142, 143, 150

The elective upper-division courses in English can be satisfied in part by one or more courses in History, Political Science, Comparative Literature and other departments after consultation with, and prior approval of, the major adviser.

The total of 36 upper-division units may include units earned in the Education Abroad Program.

**Total Units for the Major..... 36-63**

**Major Adviser.** Olga Stuchebrukhov

**Minor Program Requirements:**

UNITS

**Russian .....** **20**

Russian 101A, 101B, 101C ..... 12

Other upper division Russian courses ..... 8

**Honors and Honors Program.** The honors program comprises at least one quarter of study under course 194H, which will include a research paper. For details consult the major adviser.

**Study Abroad.** Students who have completed one or two years of Russian language study can participate in the Education Abroad Program (EAP) in Moscow. Many of our students also participate in summer, semester, and year-long programs sponsored by CIEE and ACTR in St. Petersburg and Moscow.

**Prerequisite Credit.** Credit normally will not be given for a course if that course is the prerequisite for a course already completed.

**Courses in Russian (RUS)****Lower Division**

**Course Placement.** Students who have learned Russian at home must consult the department for placement instructions. Students with two years of Russian in high school normally continue in Russian 2; those with three years, Russian 3; those with four years, Russian 4.

**1. Elementary Russian (5)**

Discussion—5 hours; laboratory—1 hour. Introduction to Russian grammar and development of all language skills in a cultural context with special emphasis on communication. (Students who have successfully completed Russian 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.) GE credit: ArtHum | AH, WC.—F. (F.)

**1A. Accelerated Intensive Elementary Russian (15)**

Lecture/discussion—15 hours. Special 12 week accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Introduction to Russian grammar and development of all language skills in a cultural context with emphasis on communication. Not open to students who have completed course 1, 2, or 3—*Su.* (*Su.*) Arnett

**2. Elementary Russian (5)**

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of grammar and language skills developed in course 1. GE credit: ArtHum | AH, WC.—W. (*W.*)

**3. Elementary Russian (5)**

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Continuation of grammar and language skills developed in course 2. GE credit: ArtHum | AH, OL, WC.—S. (*S.*)

**4. Intermediate Russian (4)**

Laboratory/discussion—4 hours. Prerequisite: course 3. Grammar review and conversational practice in Russian. GE credit: ArtHum | AH, OL, WC.—F. (*F.*)

**5. Intermediate Russian (4)**

Discussion—4 hours; laboratory—1 hour. Prerequisite: course 4. Grammar review. Introduction to literature in its sociopolitical context. Conversational practice. GE credit: ArtHum | AH, OL, WC.—W. (*W.*)

**6. Intermediate Russian (4)**

Discussion—4 hours; laboratory—1 hour. Prerequisite: course 5. Grammar review. Intermediate conversation and continued reading of literature. Social and cultural practices in contemporary Russia; introduction to Russian history. GE credit: ArtHum | AH, OL, WC.—S. (*S.*)

**98. Directed Group Study (1-5)**

Discussion—1-5 hours. (P/NP grading only.)—F, W, S. (*F, W, S.*)

**99. Special Study for Undergraduates (1-5)**

(P/NP grading only.)—F, W, S. (*F, W, S.*)

**Upper Division****101A. Advanced Russian (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 6 or consent of instructor. Topics in Russian. Grammar for the advanced student. Reading and discussion of journalistic texts and classic and contemporary literature. Conversation exercises utilizing literary and colloquial variants of current Russian speech. GE credit: ArtHum | AH, WC.—F. (*F.*) Avramenko

**101B. Advanced Russian (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 101A or consent of instructor. Continuation of course 101A. Topics in Russian grammar for the advanced student. Reading and discussion of journalistic texts and classic and contemporary literature. Conversation exercises utilizing literary and colloquial variants of current Russian speech. GE credit: ArtHum | AH, WC.—W. (*W.*) Avramenko

**101C. Advanced Russian (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 101B. Continuation of course 101B. Topics in Russian grammar for the advanced student. Reading and discussion of journalistic texts and classic and contemporary literature. Conversation exercises utilizing literary and colloquial variants of current Russian speech. GE credit: ArtHum | AH, WC.—S. (*S.*) Avramenko

**102. Russian Composition (4)**

Lecture/discussion—3 hours; tutorial—1 hour. Prerequisite: course 6 or consent of instructor. Practice in writing Russian. One composition on a different topic each week. Topics include history, geography, politics, and literature of Russia; comparison of Russian and American lifestyles; current events. Conducted in Russian. GE credit: ArtHum | AH, WC, WE.

**103. Literary Translation (4)**

Discussion—3 hours. Prerequisite: course 101C. Translation of Russian literary texts into stylistically equivalent idiomatic English.

**105. Advanced Russian Conversation (4)**

Discussion—3 hours; practice—1 hour. Prerequisite: course 6. Intensive conversational practice and discussion based on current events and contemporary texts. GE credit: ArtHum | AH, OL, WC.

**122. 19th-Century Russian Literature (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 101C when the course offered in Russian; no prerequisite when offered in English. Not open to students who have taken course 121 and 127. Study of Russian literature (prose fiction, drama, poetry) from the period between 1800 and the end of the 19th century. May include authors like Pushkin, Lermontov, Gogol, Turgenev, Dostoevsky, Tolstoy, Chekhov. Offered alternately in English or Russian. GE credit: ArtHum, Wrt | AH, OL, VL, WC, WE.—Stuchebrukhov

**124. Twentieth-Century Russian Literature (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 101C when offered in Russian; no prerequisite when offered in English. Study of Russian literature (prose, drama, poetry) from the period between 1900 and the end of the 20th century. Authors like Y. Olesha, M. Bulgakov, D. Kharms, and I. Petrushevskia. Taught in Russian. Not open for credit to students who have taken courses 123 or 128. GE credit: ArtHum | AH, OL, VL, WC, WE.—Kaminer

**126. The Russian Theater (4)**

Lecture—3 hours; term paper. Prerequisite: course 101C or consent of instructor. The main works of Russian dramatists from Fonvizin to the present, including Gogol, Turgenev, Tolstoy, Ostrovsky, Chekhov, Blok, Mayakovsky, Kharms. Conducted in Russian. GE credit: ArtHum | AH, WC, WE.—Kaminer

**129. Russian Film (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: completion of Subject A requirement. History of Russian film; film and social revolution, the cult of Stalin, dissident visions; film and the collapse of the Soviet empire; gender and the nation in Russian film. Course taught in English; films are in Russian with English subtitles. (Same course as Film Studies 129.) GE credit: ArtHum, Div, Wrt | AH, VL, WC, WE.

**130. Contemporary Russian Culture (4)**

Lecture—3 hours; term paper. Prerequisite: consent of instructor. Current trends in Russian culture and the relationship between artists and the government. Topics include recent changes in the cultural scene, postmodernist trends in literature, visual art, film, and theater. Offered in alternate years. GE credit: ArtHum | AH, OL, WC, WE.—S. (*S.*)

**133. Post-Soviet Literature (4)**

Lecture/discussion—3 hours; term paper. Major authors and trends in Russian literature in post-1991 period. Discussion of impact of economic, social, and cultural turmoil of post-Soviet period on literary marketplace. Analysis of development of literary postmodernism in Russia. GE credit: ArtHum, Wrt | AH, WC, WE.—F. (*F.*) Kaminer

**139. Pushkin (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 101C or consent of instructor. Three major periods of Pushkin's poetical works: his early lyceum verse; his poetry of the early 1820s; and the mature period. Further study of Pushkin's prose fiction, drama, and journalism. GE credit: ArtHum, Div | AH, OL, WC, WE.—Stuchebrukhov

**140. Dostoevsky (in English) (4)**

Lecture—3 hours. Reading and analysis of Dostoevsky's principal works such as Crime and Punishment, The Idiot, The Brothers Karamazov, and The Diary. Study of social and political views as reflected in Dostoevsky's works. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Stuchebrukhov

**141. Tolstoy (in English) (4)**

Lecture—3 hours; term paper. Study of Leo Tolstoy's literary evolution and moral quest. Readings include his Confession, a major novel such as War and Peace or Anna Karenina, and representative shorter fiction. GE credit: ArtHum, Div, Wrt | AH, OL, WE.—Stuchebrukhov

**142. Women in Russian Culture (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: any introductory course in literature. Study of the representation of (and by) women in contemporary Russian fiction and film. Exploration of issues such as family dynamics/motherhood, sexuality, work, and women's relationship to the state. Offered in English. GE credit: ArtHum | AH, WC, WE.—Kaminer

**143. Chekhov (in English) (4)**

Lecture/discussion—3 hours; extensive writing. Examination of Chekhov's short stories and major plays, such as The Seagull, Uncle Vanya, The Three Sisters, The Cherry Orchard, and Ivanov, in the broader cultural context of European and Russian fin de siècle. GE credit: ArtHum, Div, Wrt | AH, OL, WC, WE.—Stuchebrukhov

**150. Russian Culture (4)**

Discussion—3 hours; term paper. Knowledge of Russian not required. Study of Russian culture in nineteenth and twentieth centuries. Brief introduction of the beginnings up to nineteenth century. Russian art, music, philosophy, church, traditions, and daily life. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

**192. Research Essay (2)**

Prerequisite: a Russian literature course (may be taken concurrently). A research essay, based on primary and secondary sources, dealing in depth with a topic arising from or related to the prerequisite literature course. May be repeated for credit. GE credit: ArtHum | AH, WC, WE.

**194H. Special Study for Honors Students (4)**

Independent study—4 hours. Prerequisite: open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in Russian studies.

**195H. Honors Thesis (4)**

Independent study—4 hours. Prerequisite: course 194H. Writing an honors thesis, under the direction of a faculty member, on a topic in Russian studies.

**197T. Tutoring in Russian (1-4)**

Seminar—1-2 hours; laboratory—1-2 hours. Prerequisite: upper division standing; consent of instructor. Tutoring in undergraduate courses, including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated six times for credit. (P/NP grading only.)

**198. Directed Group Study (1-5)**

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.)

**Graduate****299. Individual Study (1-12)**

Prerequisite: graduate standing. Restricted to graduate students. May be repeated for credit. (S/U grading only)

**Professional****396. Teaching Assistant Training Practicum (1-4)**

May be repeated for credit. (S/U grading only.)

**Science and Society**

(College of Agricultural and Environmental Sciences)

David M. Rizzo, Ph.D., Program Director

**Program Office.** 152 Hutchison Hall  
530-754-7277

**Faculty**

Arnold Bloom, Ph.D., Professor (*Plant Sciences*)  
 Richard M. Bostock, Ph.D., Professor  
*(Plant Pathology)*  
 James Carey, Ph.D., Professor (*Entomology*)  
 Gita Coaker, Ph.D., Assistant Professor  
*(Plant Pathology)*  
 Edward Caswell-Chen, Ph.D., Professor  
*(Nematology)*  
 Douglas R. Cook, Ph.D., Professor (*Plant Pathology*)  
 Randy Dahlgren, Ph.D., Professor (*Land, Air and Water Resources*) Academic Senate Distinguished Teaching Award  
 R. Michael Davis, Ph.D., Professor and Specialist in Cooperative Extension (*Plant Pathology*)  
 Lynn Epstein, Ph.D., Professor (*Plant Pathology*)  
 Albert Fischer, Ph.D., Professor (*Plant Sciences*)  
 Graham Fogg, Ph.D., Professor  
*(Land, Air and Water Resources)*  
 David Gilchrist, Ph.D., Professor (*Plant Pathology*)  
 Thomas R. Gordon, Ph.D., Professor  
*(Plant Pathology)*  
 John Harada, Ph.D., Professor (*Plant Biology*) Academic Senate Distinguished Teaching Award  
 Peter Herenes, Ph.D., Associate Professor  
*(Land, Air and Water Resources)*  
 William R. Horwath, Ph.D., Professor  
*(Land, Air and Water Resources)*  
 Benjamin Z. Houlton, Ph.D., Assistant Professor  
*(Land, Air and Water Resources)*  
 Lovell Jarvis, Ph.D., Professor  
*(Agricultural & Resource Economics)*  
 Marie Jasieniuk, Ph.D., Assistant Professor  
*(Plant Sciences)*  
 Annie King, Ph.D., Professor (*Animal Science*)  
 Johan Leveau, Ph.D., Assistant Professor  
*(Plant Pathology)*  
 James D. Murray, Ph.D., Professor (*Animal Science*)  
 Terrence Nathan, Ph.D., Professor  
*(Land, Air and Water Resources)*  
 Sanjai J. Parikh, Ph.D., Assistant Professor  
*(Land, Air and Water Resources)*  
 Gregory Pasternack, Ph.D., Professor  
*(Land, Air and Water Resources)*  
 James H. Richards, Ph.D., Professor  
*(Land, Air and Water Resources)*  
 David Rizzo, Ph.D., Professor (*Plant Pathology*)  
 Pamela C. Ronald, Ph.D., Professor (*Plant Pathology*)  
 Wendy Silk, Ph.D., Professor  
*(Land, Air and Water Resources)*  
 Li Tian, Ph.D., Assistant Professor (*Plant Sciences*)

**The Program.** Science and Society is an interdepartmental teaching program administered by the College of Agricultural and Environmental Sciences that offers students throughout the campus the opportunity to discover the connections that link the social, biological, and physical sciences with societal issues and cultural discourses. Course work examines discovery processes in relation to societal values, public policy and ethics, including issues associated with cultural diversity. Whenever possible, opportunities outside the classroom are included as part of the learning experience.

The Science and Society teaching program serves students of all majors and interests. It can allow lower division students who have not yet declared a major a meaningful context for exploring diverse subject matters. The minor for the program includes, in addition to Science and Society courses, upper division courses from both the College of Agricultural and Environmental Sciences and the College of Letters and Science in the areas of history and philosophy of science, policy and decision making, communication of science, and culture, ethics and applications.

**Minor Program Requirements:**

UNITS

**Science and Society** ..... 22-27  
 Science and Society 1 ..... 4  
 Science and Society 2, 5, 15, 20, 30 ... 2-4  
 One course from each of the four following areas:

*History and Philosophy of Science:* Community and Regional Development 118, 162, History 185A, 185B, History and Philosophy of Science 150, Nature and Culture 100, Philosophy 107, 108, or 109 ..... 4  
*Policy and Decision Making:* Agricultural and Resource Economics 120, 147, 150, Consumer Science 100, Environmental Science and Policy 160, 165, Political Science 175, Sociology 155, or 181 ..... 3-4  
*Communication of Science:* Agricultural Education 172, Agricultural Management and Rangeland Resources 122, Anthropology 120, Communication 115, 130, 135, 138, 140, Community and Regional Development 174, Linguistics 163, Political Science 165 ..... 3-4  
*Culture, Ethics and Applications:* Agricultural Management and Rangeland Resources 101, Community and Regional Development 142, Environmental Science and Policy 126, 164, Fiber and Polymer Science 110, International Agricultural Development 104, Plant Biology 151, Plant Pathology 140, or Sociology 144 ..... 3-4  
 Science and Society 120 ..... 3

**Minor Adviser.** D.M. Rizzo

**Related Courses.** See Agricultural and Resource Economics 120, 147, Agricultural Management and Rangeland Resources 1, 101, 122, Communication 115, 140, Community and Regional Development 118, 142, 162, 174, Avian Sciences 13, Environmental Science and Policy 126, 160, 164, 165, Fiber and Polymer Science 110, History 185A, 185B, History and Philosophy of Science 150, Nature and Culture 100, Plant Biology 12, Plant Pathology 140, Political Science 175, Wildlife, Fish, and Conservation Biology 10.

**Courses in Science and Society (SAS)****Lower Division****1. Critical Inquiry into Contemporary Issues (4)**

Lecture/discussion—3 hours; discussion—1 hour. Open to first year and new transfer students only. Contemporary issues, including global population trends, economic and environmental changes, cultural diversity and biodiversity, nutrition and food safety, fiber and textiles, changing consumer cultures. Inquiry processes emphasize ethics, multiple disciplines, and multiple perspectives. GE credit: SciEng or SocSci, Div, Wrt | SE or SS, WE.—F. (F.) Caswell-Chen

**2. Feeding the Planet: Influences on the Global Food Supply (3)**

Lecture/discussion—3 hours. Scientific principles and dynamic interactions involved in food production, food processing, nutrition, shelf life and marketing from differing viewpoints. Physical, biological and social science issues influencing the availability and safety of the food supply worldwide. GE credit: SciEng or SocSci, Wrt | SE or SS, SL.—W. (W.) Bostock, Davis

**3. Science, Technology and Society (4)**

Lecture—4 hours. Impact of developments in science and technology on the individual in society and how economics, politics, culture and values affect technological development. Not open for credit to students who have completed former course Applied Behavioral Sciences 18. Offered irregularly. GE credit: SciEng or SocSci, Wrt | SE or SS.

**4. Water in Popular Culture (3)**

Film viewing—2 hours; discussion—1 hour; lecture—1 hour. Importance of water in many aspects of society as revealed through a survey of its depictions in film. GE credit: SciEng or SocSci, Wrt | SE or SS, SL.—F. (F.) Pasternack

**5. Pathways to Discovery: Science and Society (3)**

Lecture/discussion—3 hours. Highlights a current issue and/or controversy found in contemporary society and looks at how this problem impacts and is affected by the physical, social and biological sciences. Course varies with topic offered. May be repeated two times for credit. GE credit: SciEng or SocSci, Wrt | SE or SS.

**7. Terrorism and War (4)**

Lecture—3 hours; discussion—1 hour; term paper. Exploration of terrorism and war from science and social sciences perspectives. Terrorist cells and groups; biological, chemical, nuclear, and environmental terrorism; intelligence gathering and espionage; military strategy; genocide; epochal wars; clash of civilizations; nation building; and future global scenarios. GE credit: SciEng or SocSci, Div, Wrt | SE or SS, WE.—S. (S.) Carey

**7V. Terrorism and War (4)**

Web Virtual Lecture—3 hours, autotutorial—5 hours, web electronic discussion—1 hour, extensive writing; term paper or discussion. Prerequisite: consent of instructor. Terrorism and war from science and social sciences perspectives: terrorism (terrorist cells, WMD's, religious extremism), warfare (military strategy, genocide), and statecraft (diplomacy, clash of civilizations, epochal wars). GE credit: SocSci, Wrt | SS, WC, WE.—Carey

**8. Water Quality at Risk (3)**

Lecture—2 hours; discussion—1 hour. Natural and human threats to water quality. Balance of science and policy in all aspects of attaining, maintaining, and managing water quality, water contamination. Decoding popular media coverage of water quality and water contamination. (Same course as Environmental Science and Management 8.) Not open to students who have successfully completed Environmental and Resource Sciences 8. (Formerly Environmental and Resource Sciences 8.) GE credit: SciEng or SocSci, Wrt | SE or SS, SL, WE.—W. (W.) Herenes

**9. Crisis in the Environment (3)**

Lecture—3 hours. Explores contemporary environmental issues by examining the causes, effects and solutions to a wide range of environmental problems facing the global ecosystem. Integrated discussion of political, societal and economic impact linkages with environmental problems. GE credit: SciEng or SocSci, Wrt | SE or SS, WE.—S. (S.) Dahlgren, Houlton

**10. Water, Power, Society (3)**

Lecture—2 hours; discussion—1 hour. Water resources issues. How water has been used to gain and wield socio-political power. Water resources development in California as related to current and future sustainability of water quantity and quality. Roles of science and policy in solving water problems. (Same course as Hydrologic Science 10.) GE credit: SciEng or SocSci, Wrt | SE or SS, SL.—S. (S.) Fogg

**11. California Geography (3)**

Lecture—2 hours; discussion—1 hour; term paper. Introduction to cultural/societal patterns of California and their relationship to natural resources, biomes, geomorphology, and physiography. Focus on diversity of California's environments and their impacts on and alterations by human activities. Environmental issues in the State. GE credit: SciEng or SocSci, Wrt | SE or SS, WE.—F. (F.) Richards

**12. Plants and Society (4)**

Lecture—3 hours; extensive writing—3 hours. Prerequisite: high school biology. Dependence of human societies on plant and plant products. Plants as resources for food, fiber, health, enjoyment and environmental services. Sustainable uses of plants for food production, raw materials, bioenergy, and environmental conservation. Global population growth and future food supplies. Not open for credit to students who have complete Plant Biology 12. (Former course Plant Biology 12.) (Same course as Plant Sciences 12.) GE credit: SciEng or SocSci, Div, Wrt | SE, SS.—F, W, S. (F, W, S.) Fischer, Jasieniuk, Nevins, Tian

**13. Disease and Society (3)**

Lecture—3 hours. Limited enrollment. Introduction to the concept of disease, the societal and personal impacts of past, present and future diseases, and the science behind disease discoveries, causes, evolution, diagnosis, treatment, and prevention. GE credit: SciEng or SocSci | SE or SS, SL.—W. (W.) Leveau

**15. AIDS and Society (4)**

Lecture—3 hours; discussion—1 hour. Biology of HIV transmission and AIDS and how a biological agent acts on and influences the structure of contemporary society. Includes the psychology of risk and stigma, gender issues, changes in social relationships and public policy, global implications. GE credit: SciEng or SocSci, Div, Wrt | SE or SS.—S. (S.) Radke

**18. GIS and Society (3)**

Lecture—2 hours; Laboratory—3 hours; term paper or discussion—0.3 hours. Geographic Information Systems (GIS) as a spatial technology and a tool for change in society. Evaluate physical, biological and social impact of GIS in the context of case studies such as land, water and community planning. GE credit: SciEng or SocSci, Wrt | QL, SE or SS, SL, VL—S. (S.) Wallender

**20. Genetics and Society (4)**

Lecture—3 hours; discussion—1 hour. Not open for credit to students who have completed course 140. Basic concepts of genetics, modern methods of biotechnology, the process of scientific discovery and the public perception of the process; present and future impact of genetics on society. GE credit: SciEng or SocSci, Wrt | OL, SE or SS, SL, WE.—F, W. (F, W.) Coaker, Cook, Epstein, Ronald

**25. Global Climate Change: Convergence of Biological, Geophysical, & Social Sciences (3)**

Lecture—2 hours; discussion—1 hour. Causes of global climate change and the biological, geophysical, and social consequences of such change. Methods used by different scientists for predicting future events. Complexity of global affairs. Decision making under uncertainty. GE credit: SciEng or SocSci, Div, Wrt | OL, QL, SE or SS, SL, VL, WC, WE.—W. (W.) Bloom

**25V. Global Climate Change: Convergence of Biological, Geophysical, & Social Sciences (3)**

Web virtual lecture; web electronic discussion—2 hours; autotutorial—5 hours; extensive writing—2 hours. Causes of global climate change and the biological, geophysical, and social consequences of such change. Methods used by different scientists for predicting future events. Complexity of global affairs. Decision making under uncertainty. Students cannot take both course 025 and 025V for credit. GE credit: SciEng or SocSci | SE or SS, DD, OL, QL, SL, VL, WC, WE.—F, W, S. (F, W, S.) Bloom

**30. Mushrooms, Molds, and Society (3)**

Lecture/discussion—3 hours. Fungi as organisms with which humans interact daily, societal issues arising from these interactions. Fungi in medicine, religion, agriculture, and industry, as well as cultural perceptions of fungi. GE credit: SciEng or SocSci, Wrt | SE or SS.—F, W. (F, W.) Gilchrist, Gordon, Rizzo

**40. Photography: Bridging Art and Science (3)**

Lecture/discussion—2 hours; studio—3 hours. Photography is used to explore the common ground between art and science. Photographic processes, creativity and aesthetics, chaos and order, principles of space, time and light. Photographic interpretation and documentation of the natural world. GE credit: ArtHum or SciEng or SocSci, Div, Wrt | AH or SE or SS, SL, VL, WE.—S. (S.) Nathan

**41. Understanding Performance: Appreciation of Modern Theatre, Dance, Film and Performance Art for the Humanities and Sciences (4)**

Lecture/discussion—3 hours; laboratory/discussion—1 hour. Relevance of theatre and performance to modern culture, science and society. Approaches

to theatre/dance/media/performance art, integrated into Mondavi Centre for the Arts and Theatre and Dance Department programs. (Same course as Dramatic Art 5.) GE credit: ArtHum, Div | AH, DD, OL, VL, WC, WE.—F, W, S. (F, W, S.)

**42. Earth, Water, Science, Song (3)**

Lecture—2 hours; studio—3 hours. Fusion of water and soil science with performing arts. Creative communication of scientific concepts and facts through exercises in song writing and poetry. Design, discuss and conduct public performances related to the functioning of the natural world. GE credit: ArtHum or SciEng | AH or SE, OL.—W. (W.) Silk

**70A. Genetic Engineering in Medicine, Agriculture, and Law (5)**

Lecture—5 hours. Not open to students who have taken Biological Sciences 1A, Biological Sciences 2A or equivalent, or course 20; concurrent enrollment in Plant Biology 98 required. Historical and scientific study of the impact of genetic engineering in medicine, agriculture, and law, including examination of social, ethical, and legal issues raised. Offered in a distance-learning format. GE credit: SciEng or SocSci | SE or SS, SL.—W. (W.) Harada

**90A. Issues in Environmental and Resource Sciences (2)**

Seminar—2 hours; two Saturday field trips. Prerequisite: limited to lower division students. Discussion of historical and current issues in environmental and resource sciences. Lectures, reading and field trips will provide background for selected topics.—F, W. (F, W.)

**90B. Observing and Writing in Biology (2)**

Seminar—1 hour; laboratory—1 hour; term paper. Students will observe the interactions between microscopic organisms, conduct simple laboratory experiments, describe and analyze observations and discuss scientific observations and writing.

**90C. Herbal Medicine: Relevance for the 21st Century (2)**

Seminar—2 hours. Medicinal usage of plants from biological, historical, and cultural perspectives. Broad contexts of holistic and scientific paradigms for understanding herbal medicine. Saturday field trip to teach herb identification.—W. (W.)

**90D. Saving Endangered Plant Species: Problems and Prospects (2)**

Seminar—2 hours. Endangered plant species illustrate the value of conservation biology. Topics include societal issues and plant germplasm conservation, comparisons to animal conservation issues, and the economics of and justification for preserving endangered plants.—F. (F.) Parfitt

**90E. Biotechnology—a New Era, a New Struggle (2)**

Seminar—2 hours. Animal biotechnology and its applications. Discussion topics include potential societal impacts of various technologies, factors shaping public opinion, and ethical and moral questions arising from new biotechnology applications.—F. (F.) Murray

**90F. Food Distribution in a Hungry World (2)**

Seminar—2 hours. Class size limited to 15 students. The biological, technological, environmental, and socioeconomic factors related to food distribution systems at local, regional, national, and international levels. The potential for increasing world food supply by reducing losses between harvest and consumption.—F. (F.)

**90G. Science, Society and the Environment (2)**

Seminar—2 hours. Contemporary environmental issues, scientific approaches to addressing these issues, and accompanying societal and ethical considerations.—W. (W.) Wilson

**90X. Lower Division Seminar (1-4)**

Seminar—1-4 hours. Prerequisite: lower division standing; consent of instructor. Limited enrollment. Examination of a special topic in Science and Society through shared readings, discussions, written

assignments, or special activities such as fieldwork, laboratory work, etc. May be repeated for credit.—F, W, S. (F, W, S.)

**91A. Explorations in Science and Society: Cultures and Identities (2)**

Seminar—1 hour; extensive writing or discussion—1 hour. Prerequisite: participation in the summer Special Transitional Enrichment Program (STEP) or consent of instructor; course 1 concurrently. Exploration of linkages among identity and culture, multi-disciplinary inquiry, and agricultural and environmental science issues.—F. (F.)

**91B. Explorations in Science and Society: Leadership and Collaboration (2)**

Seminar—1 hour; extensive writing or discussion—1 hour. Prerequisite: course 91A or consent of instructor. Extends understanding of culture and identity to issues of leadership, collaboration, and social action in science and society. Includes a mandatory two and half day retreat.—W. (W.)

**91C. Explorations in Science and Society: Engagement (2)**

Seminar—1 hour; internship—3 hours. Prerequisite: course 91B or consent of instructor. Explorations of the concept of engagement in science and society from philosophical and practical perspectives. Exploration of the concept of engagement based on lectures, self reflection, discussions and three hours of K-12 school internships per week.—S. (S.)

**92. Internship in Science and Society (1-12)**

Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Supervised internship on and off campus, in the community, or in institutional settings. (P/NP grading only.)

**97T. Tutoring in Science and Society (2-3)**

Discussion/lecture—6-9 hours. Prerequisite: lower division standing; completion of course being tutored; consent of instructor. Tutoring in undergraduate Science and Society courses. Assisting with leading discussion groups under supervision of instructor(s) and teaching assistants. Acting as liaison between the students and course instructor(s) to foster effective communication and interaction. May not be repeated. (P/NP grading only.)

**98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5)**

Discussion—3-15 hours. Prerequisite: lower division standing and consent of instructor. (P/NP grading only.)

**Upper Division****110. Applications of Evolution in Medicine, Human Behavior, and Agriculture (4)**

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: Biological Sciences 2A, 2B, and 2C. Class size limited to 60 students. Applications of evolutionary biology in medicine, human behavior, and agriculture. Examination of the imprint of evolution on the human life cycle from conception to death. GE credit: SciEng | SE, SL, WE.—S. (S.) Rosenheim

**120. Science and Contemporary Societal Issues (3)**

Lecture/discussion—3 hours. Prerequisite: upper division standing. Study of a contemporary societal issue/problem emphasizing critical thinking with information drawn from several disciplines. Multiple instructors illustrate the necessity of an interdisciplinary and cooperative approach in solving important issues. Topic will vary. May be repeated one time for credit. Offered irregularly. GE credit: SciEng or SocSci, Wrt | SE or SS.—S. (S.)

**121. Global Poverty: Critical Thinking and Taking Action (4)**

Lecture—3 hours; discussion—1 hour. Social science and engineering analysis of causes and effects of world poverty and of policies to reduce it via economic growth, foreign aid, and community-level interventions, e.g., in potable water, sanitation, light-

ing, small scale energy, irrigation, health and micro-finance. GE credit: SocSci | SS, WC. —W. (W.) Jarvis, Kornbluth

### 130. Contemporary Leadership (4)

Lecture—3 hours; seminar—1 hour. Prerequisite: consent of instructor. Class size limited to 40 students. Leadership, including issues, skills, and practices as they relate to individuals, organizations, diverse social settings and communities. Written and verbal communications, personality styles for collaborative work, and ethics. GE credit: OL—F, S. (F, S.) King

### 135S. Biodiversity and Society in South Africa (4)

Lecture/discussion—3 hours; term paper or discussion—2 hours; fieldwork—2 hours. Prerequisite: acceptance into the Quarter Abroad Program "Biodiversity & Conservation in South Africa" and attendance in South Africa. Biodiversity in social context of South Africa; race, politics and conservation; use of indigenous plants and animals; weeds; water issues; ecotourism. Weekend and other field trips. Offered irregularly. GE credit: SciEng or SocSci, Div, Wrt | SE or SS. —W. Cranston, Gullan

### 140. Genetics and Social Issues (4)

Lecture/discussion—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B, 1C. Social issues arising from the development and use of modern methods of biotechnology. Presentation, evaluation, and critical discussions of the present and future impact of genetics on society. Not open for credit to students who have completed course 20. GE credit: SocSci, Wrt. —W. (W.) Epstein

### 190X. Science & Society Seminar (1-4)

Seminar—1-4 hours. Prerequisite: upper division standing; consent of instructor. Class size limited to 20 students. In-depth examination at an upper division level of a special topic in Science and Society. Emphasis upon student participation in learning. Emphasis upon student participation in learning. May be repeated for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

### 192. Internship in Science and Society (1-12)

Internship—3-36 hours. Prerequisite: upper division standing and consent of instructor. Supervised internship on or off campus, in the community, or in institutional settings. (P/NP grading only.)

### 197T. Tutoring in Science and Society (1-5)

Tutoring—3-15 hours. Prerequisite: upper division standing; completion of course being tutored or the equivalent. Tutoring of students in Science and Society courses. Assistance with discussion groups and laboratory sections under supervision of instructor. May be repeated for credit if tutoring another Science and Society course. (P/NP grading only.)

### 198. Directed Group Study (1-5)

Prerequisite: upper division standing; consent of instructor. Restricted to Sustainable Agriculture and Food Systems major or with consent of instructor. Group study on focused topics in Sustainable Agriculture and Food Systems. Varies according to instructor. Course plan is adapted to student need and interest in conjunction with the expertise of the instructor. May be repeated for credit. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

### 199. Special Study in Science and Society (1-5)

Independent study—3-15 hours. Prerequisite: upper division standing; consent of instructor. Under faculty supervision, advanced students pursue a special or individualized course of study related to Sustainable Agriculture and Food Systems. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

### Graduate

#### 298. Group Study (1-5)

Prerequisite: consent of instructor. May be repeated for credit when topic differs. (S/U grading only.)

#### 299. Graduate Research (1-12)

Prerequisite: graduate student and consent of instructor. May be repeated for credit. (S/U grading only.)

### Professional

#### 390. Teaching Methods in Science and Society (1)

Discussion—1 hour. Prerequisite: graduate level and consent of instructor. Practical experience in methods and problems related to teaching Science and Society courses. Discussion of critical pedagogies specific to teaching of science-societal issues, preparing for and conducting discussion sessions, analyses of texts and supporting material, formulation of assignments, exams. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## Science and Technology Studies

(College of Letters and Science)

Timothy Choy, Ph.D., Program Director

**Program Office.** 101 Young Hall;  
[stsadvising@ucdavis.edu](mailto:stsadvising@ucdavis.edu); <http://sts.ucdavis.edu>

### Committee in Charge

Mario Biagioli, Ph.D.

(*Science and Technology Studies, School of Law*)  
Patrick Carroll, Ph.D. (*Sociology*)

Timothy Choy, Ph.D.

(*Anthropology, Science and Technology Studies*)

Marisol de la Cadena, Ph.D. (*Anthropology*)

Joseph Dumit, Ph.D.

(*Anthropology, Science and Technology Studies*)

Kathleen Frederickson, Ph.D. (*English*)

James Griesemer, Ph.D.

(*Philosophy, Science and Technology Studies*)

Timothy Lenoir, Ph.D. (*Cinema and Digital Media, Science and Technology Studies*)

Colin Milburn, Ph.D.

(*English, Science and Technology Studies*)

Roberta Millstein, Ph.D. (*Philosophy*)

Kriss Ravetto-Biagioli, Ph.D. (*Cinema and Digital Media, Science and Technology Studies*)

Daniel Stolzenberg, Ph.D. (*History*)

### The Major Program

The Science and Technology Studies (STS) major brings the perspectives of the humanities and social sciences to bear on the analysis and synthesis of science, technology, and medicine. It considers science, technology, and medicine, in tandem with their social, political, economic, and cultural contexts and implications. The major draws on the research programs of faculty in a wide range of departments, including American Studies, Anthropology, Economics, Environmental Science and Policy, History, Philosophy, Political Science, Science and Technology Studies, and Sociology. The major is suitable for students pursuing a broader understanding of science than is available within a traditional science major and for students in the social sciences interested in interpreting science, technology and medicine as part of society and culture.

**The Program.** Graduation with a degree in Science and Technology Studies requires completion of introductory courses in the social sciences and humanities, in the natural sciences, and introductory, laboratory and seminar courses in STS. Upper division work includes twelve units from each of two different, complementing areas of concentration ("modules") and twelve units (plus prerequisites) providing depth, concentration and field work opportunities in the sciences. The modules are: (1) Cultural Studies of Science and Technology; (2) Ethics, Values, and Science Policy; (3) History and Philosophy of Science; IV. Medicine, Society, and Culture.

Courses in the modules require careful selection to make the best use of the STS major. Prerequisites for courses in the sciences can be extensive and require substantial advance planning for timely completion. Students are encouraged to take advantage of faculty and staff advising to plan their course of study.

**Career Alternatives.** The STS major will create an opportunity to analyze science and allied prac-

tices from historical, philosophical, sociological, political, anthropological, and cultural perspectives. STS prepares students for careers that must address the broader social, cultural and political ramifications of science, technology and medicine such as law, journalism, public policy, economics, government, and science education. Careers that students of STS from many universities nationwide have pursued, in addition to academic careers in STS, include employment in: systems engineering, website design, science museums, non-profit health organizations, government service, libraries, law, medicine, veterinary medicine, dentistry, nursing, teaching, public health administration, media companies, management consultant practice, and the Peace Corps.

### A.B. Major Requirements

UNITS

#### Preparatory Subject Matter ..... 16

Science and Technology Studies 1 .....	4
Science and Technology Studies 20 .....	4
Eight units selected from American Studies 1A, 1E, 5; Environmental Studies 1;	
Humanities 3; Philosophy 30, 31, 32;	
Science and Society 1, 2, 3, 5; Science and Technology Studies 32; Lower-division science courses from the Approved Science Electives list below .....	8

#### Depth Subject Matter ..... 44

Twelve units each from two of the following four modules: .....

(1) Cultural Studies of Science and Technology: American Studies 101G, 158; Community and Regional Development 118, 162; History 139A, 139B; Science and Technology Studies 108, 109, 120, 130A, 131, 150, 160, 162, 165, 173, 176; Sociology 150, 175.....	12
(2) Ethics, Values, and Science Policy: Agricultural and Resource Economics 120, 147; American Studies 125; Communication 170; Computer Science 188; Environmental Science and Policy 165; History 185B; Philosophy 116, 120; Physics 137, 160; Plant Pathology 140; Political Science 171, 175; Science and Technology Studies 108, 120, 162, 164; Veterinary Medicine 170 .....	12
(3) History and Philosophy of Science: History 135A, 135B, 136, 185A, 185B; Philosophy 104, 108, 109; Science and Technology Studies 120, 130A, 130B, 131, 160, 161, 163, 164.....	12
(4) Medicine, Society, and Culture: American Studies 101G; Communication 165; Public Health Sciences 101, 160; History 139A, 139B; Science and Technology Studies 109, 120, 121; Sociology 154.....	12

Note: Although a course may be listed in more than one module, that course may satisfy only one requirement.

Science and Technology Studies 175 .....

Science and Technology Studies 180 or

190 .....

Science Electives: Select twelve units, at least

eight of which must be from upper division courses, from the Approved Science Electives list below. (Unit totals will vary with required prerequisites.) .....

Note: Students are strongly advised to choose science elective courses in consultation with faculty or staff advisers. Some courses in some areas may require prerequisites too extensive to be used for the STS major.

#### Total Units for the Major ..... 60-80

**Approved Science Electives.** Courses may be drawn from any of the following approved subject areas:

Aeronautical Science and Engineering; Animal Genetics; Animal Science; Anthropology; Applied Behavioral Sciences;

Applied Biological Systems Technology; Atmospheric Science; Avian Sciences; Biological Chemistry; Biological Sciences; Cell Biology and Human Anatomy; Chemistry; Earth & Planetary Sciences; Engineering; Engineering: Applied Science; Engineering: Biological Systems; Engineering: Chemical; Engineering: Civil and Environmental; Engineering: Computer Science; Engineering: Electrical and Computer; Engineering: Mechanical; Entomology; Environmental and Resource Sciences; Environmental Horticulture; Environmental Science and Policy; Environmental Toxicology; Evolution and Ecology; Exercise Biology; Fiber and Polymer Science; Food Science and Technology; Geology; Hydrology; Material Science and Engineering; Medical Microbiology; Medical Pharmacology and Toxicology; Microbiology; Molecular and Cellular Biology; Nematology; Neurobiology, Physiology, and Behavior; Nutrition; Pathology; Microbiology, and Immunology; Physics; Plant Biology; Plant Pathology; Population Health and Reproduction; Psychology; Soil Science; Wildlife, Fish, and Conservation Biology.

**Major Adviser.** J. Dumit

## Courses in Science and Technology Studies (STS)

### Lower Division

#### 1. Introduction to Science, Technology and Medicine Studies (4)

Lecture—3 hours; discussion—1 hour. History, philosophy, sociology, politics, and cultural studies of science, technology, and medicine. Emphasis on a broad range of perspectives. GE credit: SciEng or SocSci | SS, WE.—Carroll

#### 20. Methods in Science, Technology and Medicine Studies (4)

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 recommended. Methodological issues concerning the historical, philosophical, sociological, ethical, and political analysis of science, technology, and medicine. Detailed case studies to illustrate different methods of analysis. GE credit: SciEng or SocSci, Wrt | SS, WE.—Carroll

#### 32. Drugs, Science and Culture (4)

Lecture—3 hours; discussion—1 hour. Drugs, politics, science, society in a cultural perspective: emphasis on roles of science, government and the media in shifting attitudes toward alcohol, marijuana, Prozac and other pharmaceuticals; drug laws, war on drugs and global trade in sugar, opium, cocaine. (Same course as Anthropology 32.) GE credit: SocSci, Div, Wrt | SS, VL.—Dumit

#### 40A. Media History 1, Gutenberg to Oppenheimer (4)

Lecture—3 hours; discussion—1 hour; film viewing—2 hours; extensive writing. History of Media to 1945, with particular focus on mechanically reproduced mass media technologies including the printing press, the newspaper, photography, cinema, radio and early computing technology. Analysis of inter-related cultural and political topics. (Same course as Cinema and Technocultural Studies 40A.) GE credit: ArtHum or SocSci | AH or SS, OL, VL, WE.—F. (F.)

#### 40B. Media History 2 1945-Present (4)

Lecture—3 hours; discussion—1 hour; film viewing—2 hours; extensive writing. Prerequisite: course 40A. History of media from 1945 to present, with particular focus on the development of the computer, digital network and internet technologies in the context of other media infrastructures like radio, television and satellite networks. Analysis of inter-related cultural/political topics. (Same course as Cinema & Technocultural Studies 040B.) GE credit: ArtHum or SocSci | AH or SS, OL, VL, WE.—F. (F.)

#### 50. Ancient Science (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A or the equivalent. Study of science in ancient Greece and Rome; consideration of its social context; concentration on the basic concepts of physics, the world of medicine and biology, the history of mathematics, and the practices of astronomy, astrology and meteorology. (Same course as Classics 50.) Offered in alternate years. GE credit: ArtHum, Wrt | AH, WC, WE.—Webster

#### 51. Ancient Medicine (4)

Lecture—3 hours; discussion—1 hour. Medicine in ancient Greece and Rome; physiological conceptions of the body within scientific and social frameworks; exploration of sanitation technology and health in antiquity; medical treatment of the female body; medicine and the economy. (Same course as Classics 51.) Offered in alternate years. GE credit: AH, WC, WE.—Webster

#### 92. Internship (1-12)

Internship—3-36 hours. Prerequisite: consent of instructor. Work experience off and on campus in all subject areas offered in the program in Science & Technology Studies under the supervision of a member of the faculty. May be repeated up to 12 units for credit. (P/NP grading only.)

#### 98. Directed Group Study (1-5)

Prerequisite: consent of instructor (P/NP grading only.) GE credit: SS.

#### 99. Special Study for Undergraduates (1-5)

Prerequisite: consent of instructor (P/NP grading only.)

### Upper Division

#### 108. Intellectual Property in Science (4)

Lecture/discussion—4 hours. Prerequisite: course 1, or other Social Science or Humanities writing course. Historical and conceptual framework for contemporary debates about intellectual property and science. Topics include US patent system and copyright law, interaction between patents and industrial policy, credit in academic and industrial science, role of IP in global knowledge. GE credit: SocSci, Wrt | ACGH, SS, WE.—Biagioli

#### 109. Visualization in Science (4)

Lecture—3 hours; extensive writing or discussion—1 hour. course 1 or 20 or Anthropology 2 recommended. Anthropological approaches to scientific visualization techniques, informatics, simulations. Examination of different visualization techniques toward understanding the work involved in producing them, critical assessment of their power and limits, especially when visualizations are used socially to make claims. (Same course as Anthropology 109.) Offered in alternate years. GE credit: SocSci, Wrt | SS, VL, WE.—Dumit

#### 120. Religion, Magic and Science (4)

Lecture—3 hours; extensive writing. Religion, magic, and science from the middle ages to the present. Contrast between modern scientific methodology and religious and magical thinking. (Same course as Religious Studies 120.) Offered in alternate years. GE credit: GE credit: ArtHum, Div, Wrt | AH, OL, VL, WC, WE.—Coudert

#### 121. Special Topics in Medical Anthropology (4)

Lecture/discussion—4 hours. Prerequisite: Anthropology 2 recommended. Introduction to critical medical anthropology. Topics include anthropological analysis of bio-medicine, psychiatry, systems of knowledge and healing, the body, emotions, and clinical encounters in a cross-cultural perspective. (Same course as Anthropology 121.) GE credit: SocSci, Div, Wrt | SS, WC, WE.—Giordano

#### 129. Health and Medicine in a Global Context (4)

Lecture/discussion—4 hours; term paper. Prerequisite: Anthropology 2 recommended. Recent works in medical anthropology and the science studies of medicine dealing with global health issues such as AIDS, pandemics, clinical trials, cultural differences in illnesses, diabetes, organ trafficking, medical

technology and delivery, illness narratives, and others. (Same course as Anthropology 129.) GE credit: SocSci, Div, Wrt | SS.—Dumit

#### 130A. From Natural History to the History of Nature (4)

Lecture/discussion—3 hours; term paper. Prerequisite: History 135A recommended. Evolution and demise of natural history as a discipline from Aristotle to Linnaeus. Considers ancient views of nature and its Renaissance rediscovery; the emergence of biology, botany, geology, and zoology; the history of taxonomy and classification. Offered in alternate years. GE credit: ArtHum or SciEng, Wrt | AH or SE, WE.

#### 130B. History of Modern Biology (4)

Lecture/discussion—3 hours; term paper. Prerequisite: course 130A recommended. Development of modern biology from pre-Darwinian roots to the present. Considers emergence of modern biological specialities and consolidation of biological theory around evolutionary ideas. History of allied fields such as genetics, paleontology, embryology, ecology, systematics and molecular biology. GE credit: ArtHum or SciEng, Wrt | AH or SE, WE.

#### 131. Darwin (4)

Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Students will explore the life and times of Charles Darwin and will trace the development of evolutionary thinking before and after the *Origin of Species* to appreciate its place in Victorian society and in the corpus of Darwin's thought. GE credit: ArtHum or SciEng, Wrt | AH or SE, WE.—Griesemer

#### 150. Gender and Science (4)

Lecture/discussion—3 hours; term paper. An interdisciplinary approach to the relations between gender and science. Topics include the biological and cultural construction of sexual difference, the role of women as practitioners of science, and feminist approaches to science. GE credit: SocSci, Div, Wrt | ACGH, DD, SS, WE.

#### 151. Media Theory (5)

Lecture—2 hours; discussion—1 hour; film viewing—3 hours; extensive writing. Critical and theoretical approaches to the emergence of new technologies since the invention of photography. Examine various approaches to media (formalist, semiotic, structuralist, Frankfurt School, cybernetics, visual and game theory). (Same course as Cinema and Technocultural Studies 150.) GE credit: AH or SS, OL, VL, WE.

#### 160. Ghosts of the Machine: How Technology Rewires our Senses (4)

Lecture—3 hours; extensive writing or discussion—1 hour. Historical, aesthetic and critical approaches to how information technologies produced ghost effects or a sense of terror in response to new media like the photograph, gramophone, film, typewriter, computer, Turing Machine. Focus on technological media transforms sense perception. Offered in alternate years. (Same course as Technocultural Studies 160.) GE credit: ArtHum or SocSci | ACGH, AH or SS, VL, WE.—Ravetto-Biagioli

#### 161. Time: Mechanism and Measurement (4)

Lecture/discussion—3 hours; term paper. Prerequisite: course 1. Cultural concepts of time; units and instruments of time measurement; historical differences in the social organization of time; and time measurement in twentieth-century science. GE credit: SocSci, Wrt | SS, WE.

#### 162. Surveillance Technologies and Social Media (4)

Lecture—3 hours; film viewing—3 hours; term paper. Prerequisite: Technocultural Studies 1 or course 20. Study of the ubiquitous presence of CCTV, face recognition software, global tracking systems, biosensors, and data mining practices that have made surveillance part of our daily life. Exploration of the boundary between security and control, information and spying. (Same course as Cinema &

Technocultural Studies 162.) Offered in alternate years. GE credit: ACGH, AH or SS, OL, VL, WE.—Ravetto

### 163. History of Communication Technologies (4)

Lecture/discussion—3 hours; term paper. History of communication technologies from the late Middle Ages to the 20th century. Questions of technology, knowledge, power and culture. Particular attention to questions about information and truth. Offered in alternate years. GE credit: SocSci | SS, WE.

### 164. Writing Science (4)

Lecture/discussion—3 hours; extensive writing. Prerequisite: English 3 or course 1, or equivalent. Texts and writing practices in the production of scientific knowledge. Surveys the literary structure of scientific arguments; history of scientific genres; rhetoric and semiotics in scientific culture; graphical systems in the experimental laboratory; narratives of science, including science fiction. (Same course as English 164.) Offered in alternate years. GE credit: ArtHum, Wrt | AH, SL, WE.—Milburn

### 165. Built Environments (4)

Lecture—3 hours; extensive writing. Built environments, which are designed to support forms of life. Their role as carriers of cultural memory and in turning knowledge of nature into social assets. Historical constellations of knowledge, social order, and power. Offered in alternate years. GE credit: SocSci, Wrt | SS.

### 172. Video Games and Culture (4)

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 1 or Technocultural Studies 1 or English 3 or equivalent. Critical approaches to the study of video games, focusing on formal, historical, and cultural modes of analysis. History of software and hardware in North American and global contexts. Relations of games to society, politics, economics, literature, media, and the arts. (Same course as Cinema and Technocultural Studies 172 and English 172.) GE credit: ArtHum or SocSci | ACGH, AH or SS, VL.

### 173. Science Fiction (4)

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or equivalent. Literary modes and methods of science fiction. Representative texts, authors, and themes of the genre—e.g., time travel, alternative universes, and utopias. Relations of science fiction to science, philosophy, and culture. (Same course as English 173.) GE credit: ArtHum, Wrt | AH, WE.

### 175. Laboratory Studies Lab (4)

Lecture/discussion—4 hours. Prerequisite: upper division standing or consent of instructor. Hands-on training in Science and Technology Studies fieldwork, interviewing, archival research and data analysis. Review of laboratory studies literature, informed consent procedures, ethics, and care of the data. Individual and group projects possible. GE credit: SocSci | SS, WE.

### 176. Sociology of Knowledge, Science, and Scientific Knowledge (4)

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: Sociology 1, 2, or 3 recommended. Social, cultural, and historical dimensions of knowledge, especially scientific knowledge. Problems, methods, and theory in sociology of scientific knowledge. Laboratory and historical case studies. Scientific and technical knowledge in institutional and organizational contexts. (Same course as Sociology 176.) GE credit: SocSci | SS.—Carroll

### 180. Topics in History and Philosophy of Science (4)

Seminar—3 hours; term paper. Prerequisite: course in History and Philosophy of Science or other coursework relevant to topic. In depth treatment of selected topics in the history and philosophy of science. Possible topics include history of modern physics, history of molecular biology, science and society, science and power, scientific explanation, technology and culture, theory testing. May be repeated for credit with consent of instructor.

### 190. Seminar in Science, Technology and Medicine Studies (4)

Lecture/discussion—3 hours; term paper. Prerequisite: open to junior and senior Science and Technology Studies majors only. Intensive reading, discussion, research and writing by small groups in selected topics of science, technology, and medicine studies scholarship. Emphasis on individual research projects.

### 192. Internship (1-12)

Internship—3-36 hours. Prerequisite: consent of instructor. Work experience off and on campus in all subject areas offered in the program in Science & Technology Studies under the supervision of a member of the faculty. May be repeated three times for up to 12 units for credit. (P/NP grading only.)

### 198. Directed Group Study (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

### 199. Special Study for Advanced Undergraduates (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

## Graduate

### 200. Theories and Methods in Science & Technology Studies (4)

Seminar—3 hours; term paper. Theories and methods of Science & Technology Studies as a field of critical and empirical scholarship, and examination of various contexts in which STS has emerged worldwide. May be repeated one time for credit with consent of instructor.

### 298. Group Study (1-5)

Prerequisite: consent of instructor. (S/U grading only.)

### 299. Research (1-12)

Prerequisite: consent of instructor. (S/U grading only.)

## Professional

### 396. Teaching Assistant Training Practicum (1-4)

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

## Sexuality Studies

(College of Letters and Science)

<http://gsws.ucdavis.edu/sexualitystudies>

The interdisciplinary minor in Sexuality Studies offers students a unique opportunity to study the human-made aspects of sexual identities, desires, and practices, which differ across cultures and historical moments, and are not reducible to biology or anatomy. The minor in Sexuality Studies core and elective courses have sexuality at their center. Additional courses invite students to integrate their study of sexuality with issues of gender; race and ethnicity; class; politics and activism; literature and popular culture; law; and other domains.

The minor is sponsored by the Program in Gender, Sexuality and Women's Studies.

## Minor Program Requirements:

UNITS

### Sexuality Studies ..... 18-20

One Core Course:

Women and Gender Studies 170..... 4

Two Elective courses from the following:

Anthropology 139 BN, English 186,

Epidemiology and Preventative Medicine 163, History 184, Human Development

12, Psychology 158, Science and Society

15, Women and Gender Studies 70... 7-8

Two Elective courses from Field B (below) or

seminars/individual study by petition to

achieve a total of 18-20 units:

American Studies 115, Asian American

Studies 112, Chicana/o Studies 160,

English 166, German 145, History 132, Political Science 152, Sociology 120, Women and Gender Studies 140, Women and Gender Studies 179 ..... 8

## Restrictions.

(A) Students may take no more than one lower division course to satisfy requirements for the minor.

(B) To satisfy the interdisciplinary component of the minor, students must either split their coursework roughly equally between two programs/departments or take coursework in at least three programs/departments.

(C) Students may petition the minor adviser to accept Special Topics courses and Capstone/Senior Seminars as additional courses, as long as their course of study follows the minor's lower-division restriction and interdisciplinary requirements.

(D) Students may petition the minor adviser to accept up to four units of registered individual study, group study or internship towards the minor program, as long as their course of study follows the minor's lower-division restriction and interdisciplinary requirements.

**Advising.** Program in Gender, Sexuality and Women's Studies, 1200 Hart Hall 530-752-6429

## Social and Ethnic Relations

(College of Letters and Science)

The interdisciplinary minor in Social and Ethnic Relations explores the racial, ethnic, class and gender aspects of human relations in the modern world. Students study human societies and cultures from a multi-ethnic perspective and across established academic departmental lines. The minor is jointly sponsored by African American and African Studies, Asian American Studies, Native American Studies, and Women and Gender Studies.

## Minor Program Requirements:

UNITS

### Social and Ethnic Relations ..... 24

Select one course from each of the following six groups to total 24 units:

(A) African American and African Studies

100; Anthropology/Native American

Studies 134; Women's Studies 102

(B) African American and African Studies

123, 133, 145A

(C) Asian American Studies 1, 2, 100,

110, 130

(D) Chicana/o Studies 130, 132

(E) Native American Studies 1, 10, 115,

119, 130A, 130B, 130C, 157, 180

(F) Women's Studies 103, 104, 180

**Restrictions.** (A) Courses applied toward the satisfaction of a major may not also be offered in satisfaction of the minor. (B) No more than four units (one course) may be lower division.

**Advising.** Contact the Program in Asian American Studies, 3131 Hart Hall, [ethnicstudiessao@ucdavis.edu](mailto:ethnicstudiessao@ucdavis.edu).

## Social Sciences

(College of Letters and Science)

**Program Office.** 469 Kerr Hall; 530-752-0741

## Committee in Charge

Michael Kurlaender, Ph.D. (*School of Education*)

Dina Okamoto, Ph.D. (*Sociology*)

Marianne Page, Ph.D. (*Economics*)

Heather Rose, Ph.D. (*School of Education*)

Kimberlee Shauman, Ph.D. (*Sociology*)

Ann Stevens, Ph.D. (*Economics*)

## Emeriti Faculty

Nigel Allan, Ph.D., Professor Emeritus  
 Dennis J. Dingemans, Ph.D., Senior Lecturer Emeritus  
 Howard F. Gregor, Ph.D., Professor Emeritus  
 Frederick J. Simoons, Ph.D., Professor Emeritus  
 Kenneth Thompson, Ph.D., Professor Emeritus

## The Program of Study

The Program in Social Sciences promotes the development of innovative curricular initiatives across the social sciences, including offering broadly conceived, integrative undergraduate-level and graduate-level courses. Faculty affiliated with the program are often engaged in interdepartmental teaching and research.

# Social Theory and Comparative History

(College of Letters and Science)

This designated emphasis was disestablished effective September 19, 2011.

**Program Office.** Center for History, Society, and Culture, 5211 Social Sciences and Humanities Building 530-752-3046

## Courses in Social Theory and Comparative History (STH) Graduate

### 250. Research in Social Theory and Comparative History (4)

Seminar—3 hours; term paper. Prerequisite: admission to Social Theory and Comparative History Designated Emphasis. Theoretically informed research in comparative history. Students read exemplary works and learn to frame their own research projects. Presentations include Center for History, Society, and Culture faculty and visitors discussing current research.—S. (S.)

### 290. Advanced Topics in Social Theory and Comparative History (4)

Seminar—3 hours; term paper. Prerequisite: consent of instructor and History 204 or Sociology 242A. Interdisciplinary study of particular substantive problems in social theory and comparative history. Topics vary.—F, W, S. (F, W, S.)

### 295. Advanced Group Research in Social Theory and Comparative History (1)

Discussion—1 hour. Prerequisite: consent of instructor. Participation in research workshops sponsored by the Center for Comparative Research for History, Society, and Culture. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

### 296. Theory and Society Journal Editorial Workshop (1-4)

Workshop—1 hour; independent study—3 hours. Reading and offering workshop critiques of papers submitted for publication. Reading and discussion of other relevant work in history and the social sciences. May be repeated for credit up to 36 units or with consent of instructor. (S/U grading only.)—F, W, S. (F, W, S.) Gouldner

# Sociology

(College of Letters and Science)

Vicki Smith, Ph.D., Chairperson of the Department

**Department Office.** 1283 Social Sciences and Humanities Building  
 530-752-0782; <http://sociology.ucdavis.edu>

## Faculty

Thomas D. Beamish, Ph.D., Professor  
 Patrick Carroll, Ph.D., Associate Professor  
 Robert Faris, Ph.D., Associate Professor  
 Ryan Finnigan, Ph.D., Assistant Professor  
 T. Ryken Grattet, Ph.D., Professor

Laura Grindstaff, Ph.D., Professor  
 Drew Halfmann, Ph.D., Associate Professor  
 Erin R. Hamilton, Ph.D., Associate Professor  
 Bruce D. Haynes, Ph.D., Associate Professor  
 Jacob Hibel, Ph.D., Associate Professor  
 David J. Kyle, Ph.D., Associate Professor  
 Ming-Cheng Lo, Ph.D., Professor  
 Bill McCarthy, Ph.D., Professor  
 David McCourt, Ph.D., Assistant Professor  
 Stephanie L. Mudge, Ph.D., Assistant Professor  
 Caitlin Patler, Ph.D., Assistant Professor  
 Kimberlee A. Shauman, Ph.D., Professor  
 Xiaoling Shu, Ph.D., Professor  
 Chris Smith, Ph.D., Assistant Professor  
 Vicki Smith, Ph.D., Professor  
 Eddy U, Ph.D., Associate Professor  
 Diane L. Wolf, Ph.D., Professor

## Emeriti Faculty

Fred Block, Ph.D., Research Professor and Professor Emeritus  
 Lawrence E. Cohen, Ph.D., Professor Emeritus  
 James C. Cramer, Ph.D., Professor Emeritus  
 Diane H. Felmlee, Ph.D., Professor Emerita  
 John R. Hall, Ph.D., Professor Emeritus  
 Carole E. Joffe, Ph.D., Professor Emerita  
 Carl C. Jorgensen, Ph.D., Professor Emeritus  
 John F. Lofland, Ph.D., Professor Emeritus  
 Lyn H. Lofland, Ph.D., Research Professor and Professor Emerita  
 John T. Walton, Ph.D., Professor Emeritus

## Affiliated Faculty

Lalia Kiburi, Ph.D., Lecturer

## The Major Programs

Sociology is the study of human society in all its manifestations. Its aim is to discover the process and structure of human interaction, to identify the main forces that sustain or weaken social groups, and to determine the conditions that transform social life. Sociology, like any science, is a disciplined, intellectual quest for knowledge about the fundamental nature of things.

**The Program.** The Department of Sociology offers two major programs, Sociology and Sociology–Organizational Studies. Students selecting the Sociology major may choose from four options in the major. The General Sociology emphasis allows students to obtain a broad understanding of the concepts, methods, and theories of sociology. Students with a special interest in the areas of Law and Society or Social Services may choose a more specialized program of courses and practical experience within the sociology major. The Comparative Studies and World Development emphasis provides a sociological perspective on social and economic changes throughout the world, with a stress on relationships between "developed" and "developing" societies. In their junior year, students are encouraged to consider the Education Abroad Program—especially one in a developing country.

The Sociology–Organizational Studies major develops a broad understanding of the political, social, and economic organizations that comprise modern society. This major emphasizes a sociological perspective, but incorporates a multidisciplinary field of study. The major introduces students to a range of theories and methods that social scientists use in the analysis of organizations.

**Career Opportunities.** In the Sociology major, the General option is for students desiring a solid liberal arts education as well as those interested in graduate work in the social sciences. Options in Law and Society or Social Services prepare students for careers in such areas as law, corrections, social work or counseling. The Comparative Studies and World Development emphasis prepares students for graduate training leading to careers in international fields.

The Organizational Studies (OS) major is designed to provide a broad understanding of the political, social, and economic organizations that make up modern society. Whether thinking about the structure

of government bureaucracies, legal systems, economic markets, educational systems, or workplaces, OS offers an interdisciplinary view from which to understand the contemporary world in which complex and formal organizations are ubiquitous. Formal organizations influence how we feel, what we think, and what we can accomplish. As such, the OS major provides both a basic understanding of the field as well as enhancing your ability to pursue their more specialized career interests.

At the upper-division level, you can chose one of four specialized tracks, any one of which will help to better identify and inform your career goals—whether that be in postgraduate education or a specific type of job—and pursue them after graduation. Whether you select the "Business and Society," "Public Policy and Social Welfare," "Nonprofit and Social Change Organizations" or the "Student-Initiated Theme" track, once completed you will have a unique and valuable area of expertise.

Students who plan to enroll in graduate programs in business, public policy, public administration, and education are advised to develop proficiencies in statistics and calculus (such as the Math 16 series).

**Track 1:** The Business and Society track is for students who hold an interest in or wish to pursue careers in management or corporate professions and who are interested in economic institutions and commerce, management and administration, work and workplaces, and labor markets. Courses in this cluster analyze businesses, firms, corporations, and markets—nationally and globally—and their place in society, historically and in the present, from a critical perspective. The BAS examines the origins of business corporations and economic markets (and relations); the power relations, inequalities, and stratification associated with contemporary business organizations (firms and corporations); why business organizations rely on particular organizational structures to increase their efficiencies and effectiveness; and overviews of the role business and regulatory organizations play in the economy.

Postgraduate training and careers that follow from this cluster:

- Professional training: MBA programs; mediation programs; law; public policy.
- Graduate training: sociology; economics; Ph.D. business school programs (with concentrations in organizational behavior, entrepreneurship, industrial relations, economic analysis, policy analysis, labor relations).
- Career paths: managers, human resources professionals, project managers, diversity personnel, corporate social responsibility personnel, lobbyists, business entrepreneur, labor relations specialists, creative professionals, research staff at policy institutes such as Economic Policy Institute, Urban InstituteE2.

### Track 2: Public Policy and Social Welfare (PPSW)

The PPSW track is for students who hold an interest in or plan to pursue careers in government and/or social welfare organizations. Courses in this track emphasize how formal organizations and institutions emerge to address key social problems and the policies they generate and utilize to solve them; the unique challenges that government and other policy oriented organizations confront in addressing and managing public problems and promoting the common good; and the dynamics and special circumstances that specific organizational/institutional policy fields such as education, health care, and social welfare confront in seeking to fulfill their charge.

Postgraduate training and careers that follow from this track:

- Professional training: programs in public policy, public administration, government, social welfare, counseling, public affairs, law, leadership institutes, community psychology.

- Graduate training: Ph.D. programs in sociology, political science, public administration, education, educational leadership.
- Career paths: consultants, social service workers and administrators, staff at policy institutes and think tanks, program evaluation and development, nonprofit administrators, lawyers, teachers, research staff at policy institutes and think tanks, leadership positions in education, including higher education, counselors.

#### Track 3: Nonprofit and social movement organizations (NSMO):

The NSMO track is for students who wish to contribute to local, national, and global transformation(s), to social justice, and/or who plan to pursue a career in the non-profit sector focusing on addressing specific causes and fulfilling social agendas. Students in this cluster may have particular interest in understanding the role that informal and formal organizations—from well-organized and mature non-profits to emergent social movement organizations—play in responding to and affecting social change. This cluster familiarizes students with the unique capacity of organizations to change the world but simultaneously, the barriers, limitations, and challenges to doing so.

Postgraduate training and careers that follow from this track:

- Professional training: programs in community development, regional development, urban development, public policy, public administration, Master's programs in social change, law and social change, business programs with a concentration in corporate responsibility.
- Graduate training: programs sociology, history, labor studies, development, international relations, political science.
- Career paths: working in nongovernmental organizations around the world (NGO's), joining the Peace Corps or Teach America; teaching in other countries; jobs in any number of areas that are the focus of social change and social justice efforts (energy, housing, labor, community and regional development, health, corporate social responsibility); working in for-profit companies in the areas of energy, corporate social responsibility, work/family support programs, research staff at policy institutes and think tanks.

Track 4: Student-Initiated Track: Select a combination of five courses from any of the above 3 themes (at least three courses should be from SOC). Students choosing this track must meet with a SOC undergraduate adviser to obtain approval of selected courses.

## Sociology

### A.B. Degree Requirements: General emphasis:

	UNITS
<b>Preparatory Subject Matter.....</b>	<b>29-30</b>
Sociology 1; 46A, and 46B .....	14
Sociology 2, 3, 4, 5, 11, 25, 30A, or 30B .....	3-4
Anthropology 2 or 20 .....	4
Select from History 4A, 4B, 4C, 6, 7A, 7B, 7C, 8, 9A, 9B, 10C, 15, 17A, 17B.....	4
Select from Philosophy 5, 14, 24 .....	4

### Depth Subject Matter.....

- (A) Sociology 100.....4

- (B) Select one course from each of the

following four categories:

- Individual, Culture and Society:* Sociology 125, 126, 135.....4
- Stratification and Social Differentiation:* Sociology 130, 132, 140.....4
- Organizations and Institutions:* Sociology 118, 131, 146, 180A.....4
- Social Dynamics:* Sociology 104, 141, 143A, 170.....4

(C) Select three upper division courses from one of the following clusters, not counting courses taken to fulfill requirement B.....12

(1) *Individual, Culture and Society:*

- Sociology 102, 120, 122, 125, 126, 128, 129, 131, 132, 134, 135, 137, 143B, 148, 150, 152, 153, 172, 173, 174, 175, 176

(2) *Stratification and Social Differentiation:*

- Sociology 118, 128, 129, 130, 132, 133, 134, 140, 145A, 145B, 171, 172, 185, 185Y, 188, and not more than one of the following courses: African American and African Studies 123; Asian American Studies 100; Chicana/o Studies 110; or Native American Studies 115

(3) *Organizations and Institutions:*

- Sociology 118, 124, 131, 133, 139, 146, 149, 150, 151, 154, 155, 159, 160, 180A, 180B, 181, 182, 183, 185, 185Y

(4) *Social Dynamics:* Sociology 104, 123, 125, 138, 141, 143A, 145A, 145B, 147, 148, 156, 157, 158, 170

(5) *Student-Initiated Thematic Cluster:* developed with a faculty adviser and approved by the Sociology Undergraduate Curriculum Committee

(D) Eight units of Sociology beyond courses taken to fulfill above requirements, and outside of the course cluster used to fulfill requirement C.....8

(E) One additional elective upper division Sociology course not already used to fulfill other major requirements. May use Sociology 190X, 191, 192/193, 194H, 195.....4

### Total Units for the Major .....73-74

### Law and Society emphasis:

### Preparatory Subject Matter.....30

Sociology 1; 3, 4, or 11; 46A & 46B ....18

Select from Anthropology 2, 20; Political

Science 1, 3, 4, 7 .....

Select from History 4A, 4B, 4C, 6, 7A, 7B,

7C, 8, 9A, 9B, 10C, 15, 17A, 17B.....4

Philosophy 5, 14, or 24.....4

### Depth Subject Matter .....43-44

Sociology 100 and 155 .....

Select courses from the following categories:

(1) *Individual Culture and Society:* Sociology 125, 126, 135.....4

(2) *Stratification and Social Differentiation:* Sociology 130, 132, 140.....4

(3) *Organizations and Institutions:* Sociology 118, 131, 146, 160, 180A .....

(4) *Crime and Social Dynamics:* Sociology 120, 150, 151, 152, 171.....12

(5) *Stratifications and Social Dynamics:* Sociology 118, 137, 148, 156, 157, 158;

African American and African Studies 123,

145A, 145B; Chicana/o Studies 130,

132; Native American Studies 117,

118.....4

(6) *Legal Studies:* Asian American Studies 155;

Chicana/o Studies 182; English 107;

Environmental Science and Policy 161;

Environmental Toxicology 138; Hydrology

150; Philosophy 119; Political Science

122, 150, 151, 152, 154; Psychology

153; Women's Studies 140.....3-4

One additional elective upper division

Sociology course not already used to fulfill

other major requirements. May use

Sociology 190X, 191, 192/193, 194H,

195.....4

### Total Units for the Major .....73-74

### Social Services emphasis:

### Preparatory Subject Matter.....28-30

Sociology 1; choose one course from: 2 or 3;

46A and 46B .....

Psychology 1 .....

Select two courses from: African American and African Studies 10, 15; Asian American

Studies 1, 2; Chicana/o Studies 10, 50; Native American Studies 1, 10; Sociology 4, 11, 30A, or 30B .....

### Depth Subject Matter ..... 44

Sociology 100, 131, 140, and 185 or

185Y .....

Psychology 140, 142, 151, or 168 .....

Select courses from the following categories:

(1) *Social Issues (choose two):* Sociology 104,

120, 122, 124, 139, 143A, 146, 149,

150, 153, 154, 155, 156, 160, 170,

171.....

(2) *Social Interaction (choose one):* Sociology

126, 127, 128, 143B, 148, 157 .....

(3) *Race and Ethnicity (choose one):* African

American and African Studies 100; Asian

American Studies 102, 131, 150; 150B,

150C, 150D, 150E; Chicana/o Studies

110; Community and Regional

Development 176; Native American

Studies 115; Sociology 129, 130, 134,

137, 172.....

(4) *Gender (choose one):* Sociology 132, 133,

145B, 172.....

(5) *Organizational Behavior (choose one):*

Sociology 139, 146, 151, 154, 159,

180A, 180B, 181, 182, 183 .....

### Total Units for the Major.....72-74

### Comparative Studies and World Development emphasis:

### Preparatory Subject Matter ..... 30-60

Sociology 1; 5; 46A and 46B .....

Economics 1B .....

Anthropology 2 or 20 .....

History 10C or Political Science 2 .....

Course work in one modern foreign language at the two-year level or provide proof of proficiency .....

27-30

### Depth Subject Matter ..... 48

Sociology 100, 104, 141, 145A,

170 .....

Anthropology 126A, 126B, or Economics

115A .....

Anthropology 127; Sociology 118, 130,

131, 143A, 144, 145B, 156, 158 .....

12

Regional focus, three courses from one of the following groups .....

(1) *Africa:* African American and African

Studies 110, 111, 162; Anthropology

140A, 140B; History 115A, 115B, 115C,

116; Political Science 134, 149

(2) *Latin America:* African American and

African Studies 107A, 180; Anthropology

144, 146; History 159, 161A, 161B, 162,

163A, 163B, 164, 165, 166A, 166B,

167, 168; Native American Studies 120,

133; Political Science 143; Sociology 158;

Spanish 170, 172, 173

(3) *Middle East:* Anthropology 142; History

112A, 112B, 113, 190A, 190C,

193A, 193B; Jewish Studies (see an

adviser); Middle Eastern Studies (see an

adviser); Religious Studies 162; Women's

Studies 184

(4) *Asia-China & Japan:* African American and African Studies 107C; Anthropology

148A, 148B, 148C, 149A, 149B; East

Asian Studies 113; Economics 171; History

191 (series), 194A, 194B, 194C; Political

Science 148A, 148B; Religious Studies

165, 170, 172; Sociology 147, 188

(5) *Southeast Asia/Pacific:* Anthropology

143A, 143B, 145, 147; Economics 171;

History 191 (series), 195B, 196A, 196B;

Political Science 148B, 148C; Religious

Studies 165, 170, 172

### Total Units for the Major.....78-108

**Sociology—Organizational Studies****A.B. Degree Requirements:**

	UNITS
<b>Preparatory Subject Matter .....</b>	<b>30</b>
Sociology 1; 2; 4, 5 or 11; 46A & 46B .....	22
Economics 1A and 1B .....	8

**Depth Subject Matter..... 45**

Sociology 100 .....	4
Sociology 180A.....	4
Sociology 106 (or equivalent Statistics 103).....	5
Select one course from: Communication 134, 136, 172; Sociology 126 .....	4
Select five courses from one of the following tracks; at least three of the five courses must be from Sociology: .....	20
Track 1: Business and Society: Choose from Agricultural and Resource Economics 112, 130; American Studies 125; Community and Regional Development 156, 162, 168; Economics 110B, 111B, 115A, 116, 121A, 151A, 151B; History 185B, 194D; Political Science 180, 187; Sociology 103, 138, 139, 141, 159, 160, 188	
Track 2: Public Policy and Social Welfare: Choose from: Community and Regional Development 151, 152, 154, 158, 164, 168, Economics 115A, 116; Political Science 107, 118A, 118B, 118C, 180, 187; Sociology 103, 104, 124, 154, 185	
Track 3: Nonprofit and Social Movement Organizations: Choose from Chicano Studies 132; Community and Regional Development 152, 154, 156, 158, 164, 168; Economics 111B, 115A, 116; History 185B, 194D; Political Science 180, 187; Sociology 103, 140, 156, 160, 181, 182, 183; Women and Gender Studies 187	
Track 4: Student-Initiated Track: Select a combination of five courses from any of the above 3 themes (at least three courses should be from SOC). Students choosing this track must meet with a SOC undergraduate adviser to obtain approval of selected courses.	
Select one course from: Sociology 128, 130, 132, 134, 140, 145A, 145B, 172.....4	
One additional elective upper division Sociology course not already used to fulfill other major requirements. May use Sociology 192/194H, 195.....4	

**Total Units for the Major..... 75**

**Major Advisers.** Consult the Departmental Advising office in 1282 Social Sciences and Humanities Building.

**Minor Program Requirements:****UNITS****Sociology .....** 20

Choose any five upper division courses in  
Sociology, except the following: SOC190X,  
191, 192/193, 194H, 195, 197T, 198,  
199

**Minor Advisers.** Consult the departmental Advising office in 1282 Social Sciences and Humanities Building.

**Honors Program.** An Honors Program is available to Sociology and Sociology-Organizational Studies majors who have demonstrated excellence in their field of study. To be eligible for the program, students must have a grade-point average of 3.500 in the major and the recommendation of a faculty sponsor familiar with their work. In addition to meeting the standard major requirements, students are encouraged to take a 199 course with their sponsor in the spring of their third year, prior to the seminar courses. Honors students write an honors thesis and take two quarters (8 units) of Honors coursework (SOC194H). Successful completion of the Honors Program, when combined with College GPA require-

ments, enables the student to graduate with High or Highest Honors. Students should apply for the program before they begin their fourth year.

**Graduate Study.** The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in sociology. Further information regarding graduate study may be obtained at the Department office or on our website.

Graduate students in Sociology have the opportunity to pursue designated emphases in Critical Theory, Social Theory and Comparative History, Native American Studies, Economy, Justice and Society, or Feminist Theory and Research. See these headings for further details on these interdisciplinary programs.

**Graduate Advisers.** Consult the Graduate Program Coordinator in 327 Young Hall.

**Courses in Sociology (SOC)****Lower Division****1. Introduction to Sociology (5)**

Lecture—4 hours; discussion—1 hour. Principles and basic concepts of sociology. The study of groups, culture, collective behavior, classes and caste, community and ecology, role, status, and personality. GE credit: SocSci | ACGH, DD, SS.—F, W, S. (F, W, S.)

**2. Self and Society (4)**

Lecture—3 hours; discussion—1 hour. Exploration of how self and identity are formed and transformed by socialization and social interaction in relation to roles, groups, institutions, power, and social change. Consideration of how people make decisions, fall in love, and come to blows. GE credit: SocSci, Wrt | ACGH, DD, SS.—F, W, S. (F, W, S.)

**3. Social Problems (4)**

Lecture—3 hours; discussion—1 hour. General sociological consideration of contemporary social problems in relation to sociocultural change and programs for improvement. GE credit: SocSci, Wrt | ACGH, DD, SS.—F, W, S. (F, W, S.)

**4. Immigration and Opportunity (4)**

Lecture—3 hours; discussion—1 hour or term paper. Social and demographic analysis of immigration: motives and experiences of immigrants; immigration and social mobility; immigration, assimilation, and social change; multicultural societies. Detailed study of immigration into the U.S., with comparative studies of Europe, Australia, and other host countries. GE credit: SocSci, Div, Wrt | ACGH, DD, SS, WC.

**5. Global Social Change: An Introduction to Macrosociology (4)**

Lecture—3 hours; discussion—1 hour. An introduction to change and diversity in world history, including the United States. Examines population and family, technological change and economic development, power and status, culture and identity. GE credit: SocSci, Div, Wrt | ACGH, SS, WC.

**11. Sociology of Labor and Employment (4)**

Lecture—3 hours; discussion—1 hour. Labor and employment issues in the contemporary United States with some use of historical and comparative materials. Topics will include strategies pursued by employers and employees, labor market discrimination and the role of social policies in shaping labor markets. GE credit: SocSci, Wrt | SS.

**12Y. Data Visualization in the Social Sciences (4)**

Lecture—2 hours; laboratory—1.5 hours; web virtual lecture—1.5 hours. Introduction to quantitative data across the social sciences (Communications, Political Science, Psychology, Sociology, and other disciplines). Transforming data, describing data, producing graphs, visual reasoning, and interpretations. (Same course as Communications 12Y, Sociology 12Y, Political Science 12Y) GE credit: QL, VL.—F, W, S. (F, W, S.) Cross

**25. Sociology of Popular Culture (4)**

Lecture—3 hours; discussion—1 hour. Social mechanisms that shape modern popular culture. High, folk, and mass culture: historical emergence of popular

culture. Mass media, commercialization, ideology and cultural styles. Theories and methods for analyzing cultural expressions in pop music, street art, film, television, and advertising. GE credit: SocSci, Wrt | SS, VL.

**30A. Intercultural Relations in Multicultural Societies (3)**

Lecture—1.5 hours; discussion—1.5 hours. Macrostructural analysis of contemporary multicultural societies; immigration and assimilation in comparative perspective; social construction of racial and ethnic group identities; ethnicity and gender; group conflict and cooperation; controversies surrounding multiculturalism. First course in a two-course Multicultural Immersion Program. GE credit: SocSci, Div | ACGH, DD, SS.

**30B. Intercultural Relations in Multicultural Societies (3)**

Lecture—1.5 hours; discussion—1.5 hours. Prerequisite: course 30A or consent of instructor. Social-psychological analysis of personal experiences living in a multicultural society; conforming to or rejecting group identity or stereotypes; managing and reducing conflict; cross-cultural communication; promises and problems of diversity at UC Davis. Second course in a two-course Multicultural Immersion Program. GE credit: SocSci, Div | ACGH, DD, SS.

**46A. Introduction to Social Research (4)**

Lecture—3 hours; discussion—1 hour; term paper. Examination of the methodological problems of social research. Selection and definition of problems of investigation, data-gathering techniques, and sampling. GE credit: SocSci | SS.

**46B. Introduction to Social Research (5)**

Lecture—4 hours; discussion—1 hour. Data-analysis techniques, measurement, scaling, multivariate analysis, and quantitative measures of association. GE credit: SocSci | QL, SS.

**90X. Lower Division Seminar (1-2)**

Seminar—1-2 hours. Prerequisite: lower division standing; consent of instructor. Limited enrollment. Examination of a special topic in sociology through shared readings, discussions, written assignments, or special activities such as fieldwork, laboratory work, etc. May not be repeated for credit. Offered irregularly. GE credit: SocSci | SS.

**98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. Primarily intended for lower division students. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division****100. Origins of Modern Sociological Theory (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1, 2, or 3 recommended. The origins of modern sociological thought. Special emphasis on three major theorists from the classical tradition of nineteenth century European social thought: Karl Marx, Max Weber, and Emile Durkheim. GE credit: SocSci | SS.

**102. Society and Culture of California (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1, 2, or 3 recommended. California's distinctive society and culture; sociological analyses of topical issues concerning diversity, environment, cities. Offered irregularly. GE credit: SocSci | ACGH, DD, SS.

**103. Evaluation Research Methods (4)**

Lecture—3 hours; discussion—1 hour; term paper; project. Prerequisite: course 1 or 2 or 3 recommended; course 46A and 46B recommended. Surveys applications of research methods to the evaluation of social programs, primarily emphasizing methodological issues, e.g., research design and data collection; uses of evaluation research are also discussed and placed in theoretical context. Participation in an evaluation project. Offered irregularly. GE credit: SocSci | SL, SS.

**104. The Political Economy of International Migration (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1, 2, 3, or 4 recommended. Analysis of worldwide migration patterns, and social scientific theories of international and transnational migration. Focus in economical, political, and social impact of immigration and potential for international and regional cooperation. [Same course as International Relations 104]. GE credit: SocSci | SS, WC.

**106. Intermediate Social Statistics (5)**

Lecture—4 hours; discussion—1 hour. Prerequisite: course 46B or consent of instructor. Intermediate level course in statistical analysis of social data, emphasizing the logic and use of statistical measures, procedures, and mathematical models especially relevant to sociological analysis. GE credit: SocSci | QL, SL, SS.

**118. Political Sociology (4)**

Lecture—3 hours; term paper or discussion—1 hour; project. Prerequisite: course 1, 2, or 3 recommended. Relation of social cleavages and social cohesion to the functioning of political institutions; the social bases of local and national power structures; social sources of political movement, analysis of concepts of alienation, revolution, ideology, ruling class, and elite. GE credit: SocSci | SS.

**120. Deviance (4)**

Lecture—3 hours; term paper or discussion. Prerequisite: course 1, 2, or 3 recommended. Social structural sources, institutional practices and microprocesses associated with illegality, evil, disease, immorality, disability, racial and class differences, citizenship, and the body. Special emphasis on expert knowledge and the production and management of social difference. GE credit: SocSci, Wrt | SS.

**122. Sociology of Adolescence (4)**

Lecture—3 hours; term paper or discussion—1 hour; project. Prerequisite: course 1, 2, or 3 recommended. Chronological age and social status; analysis of social processes bearing upon the socialization of children and adolescents. The emergence of youth cultures. Generational succession as a cultural problem. GE credit: SocSci | SS.

**123. American Society (4)**

Lecture—3 hours; discussion—1 hour; term paper; project. The demographic and social structure of American society and population, with emphasis on ethnic and class groups as bases for political and economic interest. Attention to selected current social controversies. Offered irregularly. GE credit: SocSci | ACGH, DD, SS.

**124. Education and Inequality in the U.S. (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1, 2, or 3 recommended. Functions of schooling in contemporary U.S. society. Racial, ethnic, social class, and gender inequalities in student outcomes. Consideration of classic and current controversies in the sociology of education and education policy. GE credit: SocSci | SS.

**125. Sociology of Culture (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 1, 2, or 3 recommended. Sociological approaches to study of historical and contemporary culture and mass media, and their structuring in relation to social actors, institutions, stratification, power, the production of culture, audiences, and the significance of culture in processes of change. GE credit: SocSci | SS.

**126. Social Interaction (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1, 2, or 3 recommended. Every day interaction in natural settings; ethnographic approaches to the understanding of social meanings, situations, personal identity and human relationships. Particular attention to the work of Erving Goffman and to principles of field observation and qualitative analysis. GE credit: SocSci, Wrt | SS.

**128. Interracial Interpersonal Dynamics (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1, 2, or 3 recommended. Analysis of the influences of cultural differences and racial stratification on interpersonal interaction in instrumental settings (e.g., work, education, political action) and intimate settings (e.g., friendship, love, marriage, family). Minority/majority relationships. Offered irregularly. GE credit: SocSci, Div, Wrt | SS.

**129. Sociology of Black Experience in America (4)**

Lecture—3 hours; discussion—1 hour; term paper; project. Prerequisite: course 1, 2, or 3 recommended. Survey of historical and contemporary theoretical sociological perspectives on the Black experience in United States. Emphasis on comparisons of Black sociological perspectives and mainstream perspectives of specific sociologists. GE credit: SocSci, Div | ACGH, DD, SS.

**130. Race Relations (4)**

Lecture—3 hours; term paper or discussion—1 hour. Functions of the social definitions of race and racial groups. Analysis of racial conflict, oppression, and other forms of ethnic stratification. Models of ethnic interaction and social change. Emphasis on racial relationships within the U.S. GE credit: SocSci, Div | ACGH, DD, SS.

**131. The Family (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1, 2, or 3 recommended. Contemporary family life in historical and cross-cultural perspective. How different family forms arose, their significance today and prospects for further family change. Attention to power relations within and beyond the family and to the social implications of family transformation. GE credit: SocSci, Div, Wrt | ACGH, DD, SS.

**132. The Sociology of Gender (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1, 2, or 3 recommended. Analysis of biological, psychological, cultural and structural conditions underlying the status and roles of men and women in contemporary society, drawing on a historical and comparative perspective. GE credit: SocSci, Div | ACGH, DD, SS.

**133. Sexual Stratification and Politics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1, 2, or 3 recommended; consent of instructor. Analysis of origins, dynamics, and social implications of sexual stratification. Examination of classical and contemporary theorists such as Engels, Freud, J.S. Mill, de Beauvoir, Juliet Mitchell, D. Dinnerstein. Attention to selected issues in social movements for and against sexual equality. Offered irregularly. GE credit: SocSci, Div | SS.

**134. Sociology of Racial Ethnic Families (4)**

Lecture—3 hours; discussion—1 hour or term paper. Prerequisite: course 1, 2, or 3 recommended. Asian American, Black, Chicano, and Native American family life in comparative historical perspective. Family structure and gender roles are considered in relation to socio-historical dynamics. Offered irregularly. GE credit: SocSci, Div, Wrt | ACGH, DD, SS.

**135. Social Relationships (4)**

Lecture—3 hours; discussion—1 hour or term paper. Prerequisite: course 1, 2, or 3 recommended. Social and cultural factors influencing friendships and intimate relationships. Topics include relationship development, relationship maintenance, and relationship loss. GE credit: Div, SocSci, Wrt | SS.

**137. African American Society and Culture 1790-1990 (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1, 2, or 3 recommended. Restricted to upper division standing. Political and social transformations of African American communities between 1790 and 1990, as seen through film, literature, and music. Topics include: Black consciousness, Afro-Slave culture, The Harlem Renaissance, and contemporary Hip Hop. Offered irregularly. GE credit: SocSci | ACGH, DD, SS.

**138. Economic Sociology (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1, 2, or 3 recommended. Overview of the rapidly growing field of economic sociology. Focus on variations in the ways that markets are organized. The relationship between individual and collective rationality will also be emphasized. GE credit: SocSci | ACGH, SS, WC.

**139. Corporations and Society (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1, 2, or 3 recommended. Study of the history and power of the modern corporation; corporate organization; politics, the state, and the corporation; labor unions and the labor process; competition, regulation and international markets; the multinational and conglomerate corporation; and mass markets and consumerism. GE credit: SocSci | ACGH, SS.

**140. Social Stratification (4)**

Lecture—3 hours; term paper or discussion—1 hour; project. Prerequisite: course 1, 2, or 3 recommended. Systems of social ranking, theories of stratification; power, prestige, culture, and styles of life of various social classes; social mobility and its consequences for social structure. GE credit: SocSci | ACGH, DD, SS.

**141. Industrialization and Social Change (4)**

Lecture—3 hours; term paper or discussion—1 hour; project. Prerequisite: course 1, 2, or 3 recommended. Selected technological and social factors. Preconditions of economic development and industrialization. Social, political, and cultural issues at various levels of economic development. Major historical differences and major current trends. Emphasis either on highly industrialized countries or on less developed countries. Offered irregularly. GE credit: SocSci, Wrt | SS.

**143A. Urban Society (4)**

Lecture—3 hours; discussion—1 hour; term paper; project. Prerequisite: course 1, 2, or 3 recommended. Theories of city origins. Analysis of the historic process of urbanization and of varying city types. Comparison of American and European experience of metropolitanization, counterurbanization, and neighborhood change. Consideration of competing theories of urban growth and change and competing visions of the urban future. GE credit: SocSci | SS.

**143B. Sociology of City Life (4)**

Lecture—3 hours; discussion—1 hour; term paper; project. Prerequisite: course 1, 2, or 3 recommended. Critical dissection of the "loss of community" issue. Analysis of the organization of primary ties in the city, of the culture of urban public life and of the learning of city skills. GE credit: SocSci, Wrt | SS.

**145A. Sociology of Third World Development (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1, 2, or 3 recommended. Introduction to theories and contemporary issues in the sociology of development. Topics such as urbanization, rural/agrarian change, class, status groups, international division of labor, sectoral shifts, international capital, informal economy, gender, and political processes are analyzed within a comparative-historical framework. Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WC.

**145B. Gender and Rural Development in the Third World (4)**

Seminar—4 hours. Prerequisite: course 1, 2, or 3 recommended. Political-economic analysis of women and work during the process of socioeconomic change in the world with particular attention to the family/household context. Offered irregularly. GE credit: SocSci, Div, Wrt | SS, WC.

**146. Sociology of Religion (4)**

Lecture—3 hours; discussion—1 hour; term paper; project. Prerequisite: course 1, 2, or 3 recommended. Relationship between social structures and religions. The social setting of the major world religions. Religious innovators and institutionalization

(churches, sects, cults). Secularization in the modern world and the rise of secular ideologies. Offered irregularly. GE credit: SocSci, Div, Wrt | SS.

#### **147. Sociological Perspectives on East Asia (4)**

Lecture—3 hours; discussion—1 hour; term paper; project. Prerequisite: course 1, 2, or 3 recommended. Sociological theories and concepts applied toward understanding East Asian society. Emphasis on the political structure, stratification, and economy in China and Japan. Analysis of historical and contemporary similarities and differences. Offered irregularly. GE credit: SocSci | SS, WC.

#### **148. Collective Behavior (4)**

Lecture—3 hours; discussion—1 hour; term paper or discussion. Prerequisite: course 1, 2, or 3 recommended. Study of behavior of human crowds and masses in extraordinary circumstances, including crowd panics, mass scares, collective protests, riots, revolutionary situations, ecstatic and revivalist gatherings, crazes, fads, and fashions. GE credit: SocSci | SS.

#### **149. Religion and American Society (4)**

Lecture—3 hours; project. Prerequisite: course 1, 2, or 3 recommended. Historical, contemporary survey of religious traditions and organizations and their relation to U.S. social and cultural patterns. Civil religion, religious pluralism, minority and deviant communities, religious migration, U.S. religion as a social institution, and religion, politics, and social stratification. Offered irregularly. GE credit: SocSci, Div, Wrt | ACGH, DD, SS, WC.

#### **150. Criminology (4)**

Lecture—3 hours; term paper or discussion—1 hour; project. Prerequisite: course 1, 2, or 3 recommended. Sociological analysis of criminal behavior in relation to social structure and the criminalization process. GE credit: SocSci | SS.

#### **151. The Criminal Justice System (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1, 2, or 3 recommended. Sociological analysis of the different components of the criminal justice system including the emergence and interpretation of criminal laws, the contemporary roles and functions of the police, criminal courts and correctional institutions. GE credit: SocSci | SS.

#### **152. Juvenile Delinquency (4)**

Lecture—3 hours; term paper or discussion—1 hour; project. Prerequisite: course 1, 2, or 3 recommended. Study of juvenile delinquency in relation to the family, peer groups, community, and institutional structures. Consideration of processing of the delinquent by formal agencies of control. GE credit: SocSci | SS.

#### **153. The Sociology of Childhood (4)**

Lecture—3 hours; term paper. Prerequisite: course 1, 2, or 3 recommended. Contemporary childhood in historical, cross-cultural, and global perspectives. Examine changes in understanding of the nature of childhood and "best interests of the child" by class, race, gender, geographic region, and historical period. Offered irregularly. GE credit: SocSci | ACGH, DD, SS, WC.

#### **154. Health and Illness (4)**

Lecture—3 hours; term paper or discussion—1 hour; project. Prerequisite: course 1, 2, or 3 recommended. Theoretical tools for understanding the social determinants of health and health care, including such topics as health policy, social sources of illness, social construction of illness, medicalization, social disparities in health, and the illness experience. GE credit: SocSci | SS.

#### **155. Sociology of Law (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1, 2, or 3 recommended. Law considered as social control; relation of legal institutions to society as affecting judicial decision making and administration of justice. Lawyers as an occupational group. Legal reform. GE credit: SocSci | SS.

#### **156. Social Movements (4)**

Lecture—3 hours; discussion—1 hour; term paper; project. Prerequisite: course 1, 2, or 3 recommended. Analysis of several aspects of social movements: mobilization, forms of organization, ideology, recruitment, leadership, strategies and tactics, development, effects. Frequent use of sound and film materials. GE credit: SocSci | SS.

#### **157. Social Conflict (4)**

Lecture—3 hours; discussion—1 hour; term paper; project. Prerequisite: course 1, 2, or 3 recommended. Analysis of the causes, dynamics, and regulation of social conflict within and between various kinds of social groupings with particular reference to nonviolent methods of waging and regulating conflict. Offered irregularly. GE credit: SocSci | SS.

#### **158. Women's Social Movements in Latin America (4)**

Lecture—3 hours; term paper. Prerequisite: course 1, 2, or 3 recommended. Contemporary women's social movements in Latin America, focusing on Honduras, El Salvador, Brazil, and Nicaragua. Examination of exploitation and oppression in Latin America. Offered irregularly. GE credit: SocSci | DD, SS, WC.

#### **159. Work, Employment, and Careers in the 21st Century (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1, 2, or 3 recommended. Historical and contemporary overview of employment, work, and occupations in American society. Study of authority and power relations, labor markets, control systems, stratification, and corporate structures, and how these factors shape work in diverse or organizational and employment setting. GE credit: SocSci | SS.

#### **160. Sociology of the Environment (4)**

Lecture—3 hours; term paper. Prerequisite: course 1, 2, or 3 recommended. Production, consumption, and urban expansion. Basic social logics surrounding current problems of resource scarcity (environmental extractions) and excess wastes (environmental additions). Ways that society can change and re-organize itself to become more environmentally conscious and hence ecologically sustainable. GE credit: SocSci | ACGH, DD, SS, WC, — Beamish

#### **161. The Civil Justice System (4)**

Lecture—3 hours; term paper. Prerequisite: course 1, 2, or 3 recommended. Empirical studies of the different aspects of the civil justice system in the United States and Global Society including the litigation, juries, civil rights, and international laws relating to trade, the environment, and human rights. Offered irregularly.

#### **170. Population (4)**

Lecture—3 hours; discussion—1 hour; term paper; project. Prerequisite: course 1, 2, or 3 recommended. Introduction to the study of human population, including theories and statistical measures; social causes and consequences of population trends; changes in population structure; geographical distribution, migration, socio-psychological factors affecting fertility. GE credit: SocSci | QL, SS.

#### **171. Sociology of Violence and Inequality (4)**

Lecture/discussion—4 hours. Prerequisite: course 1, 2, or 3 recommended. How systems of social inequality organize the practice of violence. Definitions of violence and issues affecting the social capacity for violence. Analysis and comparison of different forms of violence associated with race, class, gender relations and social organization. Offered irregularly. GE credit: SocSci | SS.

#### **172. Ideology of Class, Race and Gender (4)**

Lecture—4 hours. Prerequisite: course 1, 2, or 3 recommended. Examination of popular belief systems that accompany relations between social classes, whites and blacks, and men and women in the United States. How do dominant groups attempt to justify each relationship, and is there ideological conflict or consensus between groups. Offered irregularly. GE credit: SocSci, Div, Wrt | ACGH, DD, SS.

#### **173. Sociology Through Literature (4)**

Lecture—3 hours; discussion—1 hour; term paper; project. Prerequisite: course 1, 2, or 3 recommended. Introduction to analysis of literature as sociological data. Reading of numerous works on American and other societies by authors such as Steinbeck, Lewis, Dreiser, Schulberg, Orwell, etc. Offered irregularly. GE credit: SocSci | QL, SS.

#### **174. American Jewish Identities and Communities (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1, 2, or 3 recommended. Sociology of Jewish life, analyzing challenges to Jewish identity and community in the diaspora. Diversity within the Jewish community, Americanization, women, new immigrants, post-Holocaust Jewish identity, and LGBT Jews. Offered irregularly. GE credit: SocSci | SS.

#### **175. Mass Communication (4)**

Lecture—3 hours; term paper. Prerequisite: course 1, 2, or 3 recommended. Examines the relationship between the media and social structures. History of media-state relations. Media as reflector and shaper of values. Emphasis on current European and Marxist and pluralist theories rather than on content analysis. Offered irregularly. GE credit: SocSci | SS.

#### **176. Sociology of Knowledge, Science, and Scientific Knowledge (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1, 2, or 3 recommended. Social, cultural, and historical dimensions of knowledge, especially scientific knowledge. Problems, methods, and theory in sociology of scientific knowledge. Laboratory and historical case studies. Scientific and technical knowledge in institutional and organizational contexts. (Same course as Science and Technology Studies 176.) Offered irregularly. GE credit: SocSci | SS.

#### **180A. Complex Organizations (4)**

Lecture—3 hours; discussion—1 hour; term paper; project. Prerequisite: course 1, 2, or 3 recommended. Develops a sociological approach to organizations theory. Designed to introduce sociological concepts, address the alternative psychological and economic models, and involve students in the practice of organizational analysis. GE credit: SocSci | SS.

#### **180B. Complex Organizations (4)**

Lecture—3 hours; discussion—1 hour; term paper; project. Prerequisite: course 1, 2, or 3 recommended; consent of instructor. Builds on concepts and skills developed in course 180A. Deals with the issues of organizational decision making, design, and survival. Emphasis on relations between organizations and the effects of those relations in both the public and private sectors. Offered irregularly. GE credit: SocSci | SS.

#### **181. Social Change Organizations (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1, 2, or 3 recommended. Analysis of organizations with social change and improvement goals and programs, emphasizing voluntary associations and grassroots citizen groups. Topics treated include formation, decision making and leadership, strategies and tactics, factionalism and coalitions, effectiveness. Offered irregularly. GE credit: SocSci, Wrt | SS.

#### **182. Utopian Communal Groups and Movements (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1, 2, or 3 recommended. Formations, structures, and social life of historical and contemporary countercultural, utopian, dystopian, intentional, and religious communal settlements and movements, including comparison with other small settlement forms such as monasteries, villages, neighborhoods, encampments, and communities. Offered irregularly. GE credit: SocSci | SS.

#### **183. Comparative Organizations (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: course 1, 2, or 3 recommended; course 180A recommended. Examination of the economic, cultural, and political organization of major industrial

and developing nations. Discussion of patterns and practices, alternative theoretical models of explanation, and case studies of organizations. Societies may include Japan, Germany, Egypt, China, and the U.S. Offered irregularly. GE credit: SocSci | ACGH, SS, WC.

### **185. Social Policy (4)**

Lecture—3 hours; term paper or discussion—1 hour; project. Prerequisite: course 1, 2, or 3 recommended. Examination of social policies that affect the well-being of individuals, families and groups, including such policies as old-age pensions, health insurance, and aid to the poor. Students may not take both course 185 and 185Y for credit. GE credit: SocSci | SS.

### **185Y. Social Policy (Hybrid Version) (4)**

Web virtual lecture—1.5 hours; lecture—1.5 hours; term paper or discussion—1 hour. Prerequisite: course 1, 2, or 3 recommended. Examination of social policies that affect the well-being of individuals, families and groups, including such policies as old-age pensions, health insurance, and aid to the poor. Students may not take both courses 185 and 185Y for credit. Offered irregularly. GE credit: SocSci | SS, WE.

### **188. Markets, Culture and Inequality in China (4)**

Lecture—3 hours; term paper. Prerequisite: course 1, 2, or 3 recommended. Economic and political systems and patterns of social interaction and inequality in China. State and corporate structures and practices, market and consumer behaviors, social mobility and stratification, protest and resistance. Offered irregularly. GE credit: SocSci | SS, WC. —F.

### **189. Social Science Writing (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1, 2, or 3 recommended. Improved analytic writing and methods for reporting social science research to a wider public. Sociological analysis of the conditions of good and bad writing. GE credit: SocSci | SS.

### **190X. Seminar in Sociological Analysis (4)**

Seminar—3 hours; term paper. Prerequisite: upper division standing; course 100 (former course 165A). Limited enrollment. In-depth examination at an upper division level of a special topic in Sociology. Emphasis on student participation in learning. May not be repeated for credit. Offered irregularly.

### **191. Workshop in Contemporary Sociological Theory (4)**

Lecture—2 hours; workshop—1 hour; term paper. Prerequisite: course 100 (former 165A); senior standing. Workshop in contemporary sociological theory that allows students to explore the uses of theory in empirical inquiry on problems of interest to students. Contemporary theory considered in relation to classical and modern influences, concept formation, theory construction, and explanation. Not open for credit to students who have received credit for course 165B. Offered irregularly. GE credit: SocSci | SS.

### **192. Internship and Research Practicum (2-6)**

Internship—6-18 hours. Prerequisite: course 46A; upper division standing, approval of proposed internship and consent of instructor. Supervised internship and study in an agency, organization, or institution; application of sociological concepts to the work experience. Maximum of four units may be counted toward the major. May be repeated for credit with consent of instructor. (P/NP grading only.)—F, W, S. (F, W, S.)

### **193. Workshop in Field Research (2)**

Lecture/discussion—2 hours. Prerequisite: course 46A, course 192 or 199 concurrently for two-four units, senior standing. Overview of the process of collecting, recording, analyzing, and reporting qualitative social data. Emphasis on application of principles; each participant completes an original research project. Not open for credit to students who have completed course 194HA. Offered irregularly. GE credit: SocSci | SS, WE.

### **194H. Special Study for Honors Students (1-5)**

Prerequisite: consent of instructor. Open to Sociology majors of senior standing who qualify for the Honors program. Independent study of a sociological problem involving the writing of an Honors thesis. May be repeated up to eight units for credit. (P/NP grading only; deferred grading only, pending completion of sequence) GE credit: WE.—F, W. (F, W.)

### **194HA. Special Studies for Honors Students (4)**

Independent study—12 hours. Prerequisite: senior qualifying for honors. Directed reading, research and writing, culminating in the completion of a senior honors thesis or project under direction of a faculty adviser. (Deferred grading only, pending completion of sequence.) Offered irregularly. GE credit: SciEng | SE. —F. (F.)

### **194HB. Special Studies for Honors Students (4)**

Independent study—12 hours. Prerequisite: senior qualifying for honors. Directed reading, research and writing, culminating in the completion of a senior honors thesis or project under direction of a faculty adviser. (Deferred grading only, pending completion of sequence.) Offered irregularly. GE credit: SciEng | SE. —W. (W.)

### **195. Special Topics in Sociological Analysis (4)**

Seminar—3 hours; term paper. Prerequisite: course 1, 2, or 3 recommended. In-depth examination of topics in sociology. Emphasis on student research and writing. May be repeated for credit when topic differs. GE credit: SocSci | SS.

### **197T. Tutoring in Sociology (1-4)**

Tutorial—3-12 hours. Prerequisite: upper division standing; completion of appropriate course with distinction. Activities vary depending on the nature of the course assignment. May include (but not limited to) tutoring on course material, advising on projects and papers, and leading discussion groups. (P/NP grading only.)

### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: open to seniors only. (P/NP grading only.)

### **Graduate**

#### **201. Social Research (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Comparative survey of sociological inquiry, taught as a practicum. Philosophy of social science; values and research; research agendas and research problem formulations; research process; explanations; interpretation; study design; concept formation, measure, sampling, data acquisition, inference; rhetoric and presentation of findings.—F. (F.)

#### **206. Quantitative Analysis in Sociology (4)**

Lecture—4 hours. Prerequisite: course 106. Survey of the statistical models and methods that serve as a foundation for quantitative research in sociology, with an emphasis on multivariate regression analysis, as well as measurement theory and time series analysis. (S/U grading only.)—W. (W.)

#### **207A. Methods of Quantitative Research (4)**

Lecture—3 hours; term paper. Prerequisite: course 106 or the equivalent. Principles of study design, examination of measurement, survey research methods and multivariate analysis. Course will stress actual practice of techniques. Students will carry out quantitative data analysis using packaged computer programs. May be repeated eight times for credit with instructor approval.

### **208. Topics in Advanced Quantitative Methods in Social Science (4)**

Seminar—3 hours; term paper. Prerequisite: course 206 or the equivalent and graduate standing; major graduate student. Analysis of the logic and application of an advanced statistical model; the particular model chosen may vary. Emphasis on the model's assumptions, its strengths and weaknesses, its application for social science inquiry, and the relationship between methods and social theory. May be repeated up to 12 units for credit. Offered irregularly.

### **215. Economy, Polity, and Society (4)**

Seminar—3 hours; paper. Prerequisite: consent of instructor. Open to graduate students in sociology and related disciplines. Course introduces students to topics and selected issues in the related fields of economic and political sociology and political economy. Offered irregularly.

### **220. Deviance, Law, and Social Control (4)**

Seminar—3 hours; projects. Prerequisite: course 120 or consent of instructor. Report and discussions of literature on selected forms of deviance in relation to law and formal social control. Agency contacts and exploratory research projects. Offered irregularly.

### **224. Sociology of Education (4)**

Seminar—3 hours; term paper. Prerequisite: course 206 or the equivalent recommended. Overview of sociological theories accounting for the form, role, and evolution of educational systems. Emphasis on empirical research on education and social stratification and application to educational policy. Topics include tracking, racial/ethnic achievement inequalities, school organization, and the immigrant experience. Offered irregularly.

### **225. Cultural Sociology (4)**

Seminar—3 hours, term paper. Explores the varied ways in which culture is understood in the social sciences and the research questions that follow from contrasting viewpoints. The approach is historically informed and focused on changing cultural forms in relation to industrialization and post-modernism. Offered irregularly.

### **226. Sociological Social Psychology (4)**

Seminar—3 hours; seminar paper—1 hour. Prerequisite: graduate standing or consent of instructor. Advanced study of the varying approaches, methods, issues and topical concerns of sociological social psychology. Analysis of central and representative historical and contemporary works. Offered irregularly.

### **227. Sociology of Reproduction (4)**

Lecture—3 hours; discussion—1 hour. Recent social science scholarship in such areas as teenage pregnancy, family planning, abortion, adoption, AIDS, and new reproductive technologies; focus on the current situation in the United States. Offered irregularly.

### **230. Ethnic (Race) Relations (4)**

Lecture—3 hours; term paper. Advanced study of the determinants of ethnic groupings and their interrelationships. Major theme will be the patterns of ethnic stratification and causes of ethnic conflict. Specific focus upon dominance and resistance to dominance. Influence of social science research. Offered irregularly.

### **233. Gender, Culture, and Local/Global Transformation (4)**

Seminar—3 hours; term paper. Focus on critical approach to women and development; analyze local transformations with global connections within specific cultural contexts. Course covers theory, methodological issues, and relationship between theory and practice. Offered irregularly.

### **234. Gender, Family, and Society (4)**

Seminar—3 hours; seminar paper. Prerequisite: graduate standing or consent of instructor. The major theoretical traditions and concerns in family sociology and sociology of gender. Analysis of selected classical and contemporary works representative of functionalist, Marxist, psychoanalytic, feminist and

critical theoretical approaches to these subjects (e.g., Engels, Parsons, Freud, Horkheimer, Goode, Lasch, Mitchell). Emphasis on macro and historical questions. Offered irregularly.

#### **242A. Methodologies of Sociohistorical Inquiries (4)**

Seminar—3 hours; term paper. Prerequisite: consent of instructor not required for graduate students in the Social Sciences Division or the Humanities, Arts, and Cultural Studies Division; required for undergraduates and students from other divisions or colleges. Introduction to comparative and case methodological approaches to sociohistorical inquiry, theoretical and practical issues, and substantive research agendas ranging from study of large-scale social transformations to close microhistories, including research agendas being developed by students in the course. Offered irregularly.

#### **243. Urban Society (4)**

Seminar—3 hours; term paper. Broad overview of the issues and concerns of the field of urban sociology. Special emphasis on the human experience of urban living in contemporary, cross-cultural or historical settings. Offered irregularly.

#### **245. Developing Societies (4)**

Seminar—3 hours; term paper or project. Prerequisite: graduate student status or familiarity with problems of developing societies. Analysis of social and economic problems of developing societies from the standpoint of theory and research on modernization and underdevelopment. Nature of third world dependency and interdependence in the global political economy. Offered irregularly.

#### **248. Social Movements (4)**

Seminar—3 hours; term paper. Analysis of current issues in and contributions to the study of collective behavior and social movements; particular focus upon the strategies and tactics of social movements. Offered irregularly.

#### **254. Sociological Issues in Health Care (4)**

Seminar—3 hours; term paper. Prerequisite: open to graduate or professional students. Sociological perspectives and methods directed to health care issues. Students select topics for supervised research. The course will have a theme (described in advance) each time it is offered. Paper on research will be required. Offered irregularly. (S/U grading only.)

#### **255. Sociology of Law (4)**

Seminar—4 hours. Prerequisite: consent of instructor. Analysis of the nature of the legal process and its impact on social behavior. Will consider (1) nature and functions of law, (2) the organization and administration of law, and (3) the capacity of law to affect social behavior. Offered irregularly.

#### **265A. Classical Sociological Theory (4)**

Lecture—3 hours; discussion—1 hour. Introduces graduate students to the work of the main classical thinkers in the tradition of social theory, such as Marx, Durkheim, Weber, Simmel, Freud, G.H. Mead, and Parsons, locating them within the historical, cultural, and philosophical milieu in which their ideas originated.

#### **265B. Theory in Contemporary Sociology (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 265A. Explores the uses of theories in contemporary sociology by tracing their connections with classical sociological writings and their relations to broader theoretical concerns of contemporary social thought, with particular emphasis on relevance to the current historical, cultural and social milieu.

#### **270. Social Demography (4)**

Seminar—4 hours. Prerequisite: course 170 or consent of instructor. How social institutions affect and are affected by the level and variation of mortality, migration, and fertility. Special emphases on the determinants of fertility-related attitudes and behavior, on less-developed countries, and on contemporary empirical studies. Offered irregularly.

#### **280. Organizations and Institutions (4)**

Seminar—4 hours. Theory of formal organizations and bureaucracy. Methods of research in organizational and institutional studies. Historical and comparative analysis of political, religious, educational, military, and economic structure. Offered irregularly.

#### **288. Integrative Research Practicum (4)**

Seminar—6 hours; extensive writing; term paper. Prerequisite: courses 207A, 242A, 292A; consent of instructor. Continuing training in field, quantitative, and/or comparative-historical methods. Emphasis on students' research projects and applications of principles related to research design, concept and theory construction causality and interpretation, and data and measurement. Completion of research paper is required. —S. (S.) Grindstaff, Hall, Lo, Shumann, Shu, Wolf

#### **290. Seminar (4)**

Seminar—3 hours; term paper. (S/U grading only.) Offered irregularly.

#### **292A. Field Research (4)**

Seminar—3 hours; fieldwork. Prerequisite: graduate standing in Sociology or consent of instructor. Introduction to the logic, methods, and practices of field research, with particular emphasis on the ethnographic tradition of participant observation. Interviewing and other qualitative techniques will also be covered. Students will develop original research projects based on their own fieldwork.

#### **293. Proseminar in Sociology (2)**

Seminar—2 hours. Prerequisite: first-year Sociology graduate students only. Introduction to graduate training in sociology. A seminar designed to introduce students entering graduate work in the department to its ongoing research activities. (S/U grading only.) Offered irregularly.

#### **295. Special Topics Seminar. (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Research topics in Sociology. Specific topic will vary according to faculty interest and student demand. May be repeated for credit when topic differs. Offered irregularly.

#### **298. Group Study (1-5)**

Prerequisite: consent of instructor. (S/U grading only.) Offered irregularly.

#### **299. Individual Study (1-12)**

(S/U grading only.) Offered irregularly.

#### **Professional**

#### **390A. The Teaching of Sociology (2)**

Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing; required for first-time teaching assistants. Practical instruction in teaching methods for qualitative and quantitative courses. Pedagogical issues involved in critical sociological analysis. (S/U grading only.) Offered irregularly.

#### **390B. The Teaching of Sociology (2)**

Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing. Practical instruction in devising course syllabi, lectures and assignments for Associate-Instructors and others interested in college teaching. Discussion of pedagogical methods of teaching qualitative and quantitative courses. (S/U grading only.) Offered irregularly.

#### **396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.) Offered irregularly.

#### **Professional**

#### **466. Research Paper Workshop (2)**

Workshop—1.5 hours; discussion—0.5 hours. Prerequisite: Master of Arts standing. A workshop to assist advanced graduate students in the preparation of an original research paper. Students present their research papers and discuss issues in theory, research design, data, empirical inference, and verbal and written presentation of a professional research paper. (S/U grading only.) Offered irregularly.

## **Soil and Water Science**

(College of Agricultural and Environmental Sciences)

This major has been discontinued as of Fall 2008; see [Environmental Science and Management](#), on page 325.

## **Soil Science**

See [Earth and Planetary Sciences](#), on page 237; [Soil Science](#), on page 551; and [Soils and Biogeochemistry \(A Graduate Group\)](#), on page 552.

## **Soil Science**

(College of Agricultural and Environmental Sciences)

**Faculty.** See [Land, Air and Water Resources](#), on page 391.

**Major Programs.** See the Soils and Biogeochemistry track in [Environmental Science and Management](#), on page 325.

#### **Minor Program Requirements:**

The Department of Land, Air and Water Resources, Soils and Biogeochemistry Program, offers a minor program in soil science. The minor is especially geared toward students in the environmental sciences including Hydrologic Science, Environmental Science and Management, Environmental Toxicology, Ecological Management and Restoration, International Agricultural Development, Crop Science and Management, Environmental Horticulture and Urban Forestry, Geology, and Plant Biology.

UNITS

<b>Soil Science .....</b>	<b>21</b>
Soil Science 100 .....	5
Courses selected from Soil Science 102, 105, 107, 109, 111, 118, 120, Plant Sciences 158, Hydrologic Science 124, 134 .....	16

**Minor Adviser.** R.J. Southard ([Land, Air and Water Resources](#))

**Graduate Study.** Programs of study leading to the M.S. and Ph.D. degrees in Soils and Biogeochemistry are available. Information regarding these programs can be obtained from the graduate advisers, at <http://soils.ucdavis.edu/> and in the Graduate Announcement. See also [Graduate Studies](#), on page 120.

**Graduate Advisers.** Randy Dahlgren and Sanjai Parikh ([Land, Air and Water Resources](#))

#### **Courses in Soil Science (SSC)**

Questions pertaining to the following courses should be directed to the instructor, to the Resource Sciences Teaching Center in 1150 Plant and Environmental Sciences Building 530-752-1603, or see undergraduate and graduate Soils and Biogeochemistry courses at [http://lawr.ucdavis.edu/undergrad\\_esm.htm](http://lawr.ucdavis.edu/undergrad_esm.htm) or [http://lawr.ucdavis.edu/graduate\\_sbg.htm](http://lawr.ucdavis.edu/graduate_sbg.htm).

#### **Lower Division**

#### **10. Soils in Our Environment (3)**

Lecture—3 hours; independent study. Class size limited to 90 students. Soils in our global ecosystem; soils as natural bodies formed by interactive environmental processes; soil response to use and management; sustainable use of soil resources; role of soils in agricultural and environmental issues; role of soils in our daily lives. GE credit: SciEng | QL, SE, SL. —F. (F.) Dahlgren

**92. Soil Science Internship (1-12)**

Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in soil science. Internship supervised by a member of the faculty. (P/NP grading only.)—F, W, S. (F, W, S.)

**Upper Division****100. Principles of Soil Science (5)**

Lecture—3 hours; laboratory—3 hours; term paper. Prerequisite: Chemistry 2A-2B, Physics 1A-1B, Biological Sciences 1A; Geology 50, Biological Sciences 1C recommended. Soil as part of natural and managed ecosystems and landscapes. Solid, liquid, and gas phases and their interactions in the soil. Water, gas and heat movement in soil. Soil biology. Plant nutrient acquisition and use. Soil development, management and use. GE credit: SciEng | QL, SE, SL, VL.—F. (F.) Scow, Southard

**102. Environmental Soil Chemistry (3)**

Lecture—3 hours. Prerequisite: course 100 or the equivalent; general chemistry. Soil chemistry processes related to the fate and transport of contaminants in soil. Soil minerals, natural organic matter, surface charge, soil solution chemistry, redox reactions in soil, and sorption of inorganic and organic contaminants. GE credit: SciEng | QL, SE, SL.—W. (W.) Parikh

**105. Field Studies of Soils in California Ecosystems (5)**

Prerequisite: courses 100 and 120, or equivalent recommended. Class size limited to a minimum of 10 and a maximum of 24 students. Field-based studies of soils in California ecosystems, away from campus, throughout California. Emphasis on description and classification of soils; relationships among soils, vegetation, geology, and climate; physical, chemical, and biological processes in soils on the landscape; and the role of soils in land use. May be repeated one time for credit. GE credit: SciEng | QL, SE, SL, VL, WE.—Su. (Su.) Amundson, Dahlgren, O'Geen, Southard

**107. Soil Physics (5)**

Lecture—3 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 100, Environmental and Resource Sciences 100, Mathematics 16A, or the equivalent. Physical properties of soil. Principles of water, gas, heat, and solute movement in soil with selected examples related to soil and water management. Influence of soil properties on transfer processes. GE credit: SE.—F. (F.) Hopmans

**109. Sustainable Nutrient Management (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100 or the equivalent. Availability of nutrients in organic and conventional agricultural, vineyard, orchard and plantation forest soils; management of fertilizers, cover crops, compost, sewage sludge and manures for crop production and to prevent loss to the environment is emphasized. GE credit: SciEng | OL, QL, SE, SL, VL, WE.—S. (S.) Horwath

**111. Soil Microbiology (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 1C and Biological Sciences 1C. Major groups of microorganisms in soil, their interrelationships, and their responses to environmental variables. Role of microorganisms in cycling of nutrients. Plant-microbe relationships. Transformations of organic and inorganic pollutants. GE credit: SciEng | QL, SE, SL, WE.—W. (W.) Scow

**118. Soils in Land Use and the Environment (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or consent of instructor. Soils are considered as elements in land use planning and environmental quality. Topics include: soil survey reports, remote sensing, land capability classification, soil erosion/conservation, waste disposal on soils and soil reclamation. One one-day field trip. GE credit: SciEng | SE, SL.—S. (S.) O'Geen

**120. Soil Genesis, Morphology, and Classification (5)**

Lecture—4 hours; laboratory—3 hours (includes five one-day weekend field trips). Prerequisite: course 100; Geology 50 recommended. Recognition and description of soils; chemical, biological and physical processes of soil formation. Factors of soil formation. Interactions of soils with diverse ecosystems. Introduction to soil classification. Practice using soil taxonomy. Practical experience describing soil properties in the field. GE credit: SciEng | QL, SE, SL, VL.—S. (S.) Southard

**192. Soil Science Internship (1-12)**

Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in soil science. Internship supervised by a member of the faculty. (P/NP grading only.)—F, W, S. (F, W, S.)

**198. Directed Group Study (1-5)**

(P/NP grading only.)—F, W, S. (F, W, S.)

**199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.)—F, W, S. (F, W, S.)

**Graduate****202. Topics in Advanced Soil Chemistry (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: undergraduate course in soil chemistry, water chemistry or consent of the instructor. Restricted to 18 students. Reviews of current research in soil chemistry. Topics include double layer theory; clay mineral and oxide surface chemistry; adsorption on soil surfaces; speciation and modeling of solution ions; solubility and mineral stability diagrams. May be repeated one time for credit if topic differs.—W. (W.) Parikh

**205. Field Studies of Soils in California Ecosystems (5)**

Fieldwork—50 hours; discussion—15 hours; lecture—5 hours. Prerequisite: courses 100 and 120 or equivalent recommended. Class size limited to 24 students. Field-based soil studies in California ecosystems. Description and classification of soils; relationships among soils, vegetation, geology, and climate; physical, chemical, and biological processes; their role in land use. Similar to course 105; requires additional work for graduate credit. May be repeated one time for credit if geographic locale changes. Offered irregularly.—Su. (Su.) Amundson, Dahlgren, O'Geen, Southard

**208. Soil-Plant Interrelationships (3)**

Lecture—3 hours. Prerequisite: course 100, Plant Biology 111B or consent of instructor. Plant needs, occurrence and reactions of water and mineral nutrients in soils; root systems and their growth in soils; mass flow and diffusion mechanisms in nutrient acquisition; models relating nutrient uptake to soil and plant characteristics; nutrient assimilation and crop quality. Offered in alternate years.—W. (W.) Parikh

**211. Advanced Soil Microbiology (3)**

Lecture—3 hours. Prerequisite: Chemistry 8A-8B; course 111; Biological Sciences 102, 103 or an equivalent course recommended. Microbial metabolism of organic chemicals in soil, both natural and xenobiotic. Decomposition of organic matter. Kinetics of microbial processes in soil. Offered in alternate years.—F. Scow

**219. Ecosystem Biogeochemistry (4)**

Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: introductory courses in ecology/biology and soils recommended; undergraduates accepted with consent of instructor. Multidisciplinary analysis of energy and nutrient transfers within terrestrial ecosystems. Examination of processes and inter- and intra-system interactions between the atmosphere, biosphere, lithosphere and hydrosphere. Laboratory section uses biogeochemical simulation models to examine case studies. (Same course as Ecology 219.)—S. (S.) Houlton

**220. Pedology (3)**

Lecture—3 hours. Prerequisite: consent of instructor; course 120 recommended. Topics selected from studies of soil-forming processes, soil-geomorphic relations, mineral weathering, new developments in

soil classification, and development of pedologic theory. Topics vary from year to year. May be repeated one time for credit. Offered in alternate years.—(W.) Southard

**222. Global Carbon Cycle (3)**

Lecture—3 hours. Prerequisite: Chemistry 8A, 8B, Mathematics 16A, 16B, course 100 or the equivalent. Global carbon cycle from Phanerozoic epoch to modern times. Examination of long and short-term carbon cycles. Transfer of carbon among ocean, land and life with emphasis on humic substance formation, methods of characterization, reactions with organics and soil carbon stabilization. Offered in alternate years.—W. (W.) Horwath

**290. Special Topics in Soil Science (1-4)**

Seminar—1-4 hours. Prerequisite: graduate standing. Seminars and critical review of problems, issues, and research in soil science. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**298. Group Study (1-5)**

Prerequisite: consent of instructor. May be repeated for credit when topic differs. (S/U grading only.)—F, W, S. (F, W, S.)

**299. Research (1-12)**

(S/U grading only.)—F, W, S. (F, W, S.)

**Professional****396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**Soils and Biogeochemistry (A Graduate Group)**

A. Toby O'Geen, Ph.D., Chairperson of the Group

**Group Office.** 1152 Plant & Environmental Sciences Building  
530-752-1669; <http://soils.ucdavis.edu/>; [http://lawr.ucdavis.edu/graduate\\_sbg.htm](http://lawr.ucdavis.edu/graduate_sbg.htm)

**Faculty**

Patrick Brown, Ph.D., Professor (*Plant Sciences*)  
William Casey, Ph.D., Professor (*Chemistry*)  
Randy Dahlgren, Ph.D., Professor  
*Academic Senate Distinguished Teaching Award*  
Helen Dahlke, Ph.D., Assistant Professor  
Valerie Eviner, Ph.D., Assistant Professor  
(*Plant Sciences*)  
Graham Fogg, Ph.D., Professor  
Mark Grismer, Ph.D., Professor  
Rebecca Renee Hernandez, Ph.D., Assistant Professor  
Peter Hernes, Ph.D., Professor  
Jan Hopmans, Ph.D., Professor  
William Horwath, Ph.D., Professor  
Ben Houlton, Ph.D., Associate Professor  
Louise Jackson, Ph.D., Professor  
Sanjai Parikh, Ph.D., Associate Professor  
Eliska Rejmankova, Ph.D., Professor  
(*Environmental Science and Policy*)  
Jorge Rodrigues, Ph.D., Professor  
Kate Scow, Ph.D., Professor  
David Smart, Ph.D., Professor  
(*Viticulture and Enology*)  
Randal Southard, Ph.D., Professor  
Kerri Steenwerth, Ph.D., Adjunct Assistant Professor  
(*Viticulture and Enology*)  
Susan Ustin, Ph.D., Professor  
Chris van Kessel, Ph.D., Professor (*Plant Sciences*)

**Emeriti Faculty**

Caroline Bledsoe, Ph.D., Professor Emeritus  
André Läuchli, Ph.D., Professor Emeritus  
Roland Meyer, Ph.D., Cooperative Extension Specialist Emeritus  
G. Stuart Pettygrove, Ph.D., Soils Specialist Emeritus  
Wendy Silk, Ph.D., Professor Emeritus  
Michael Singer, Ph.D., Professor Emeritus

**Affiliated Faculty**

Victor Claassen, Ph.D., Associate Researcher  
 Stephen Grattan, Ph.D., Water Relations Specialist  
 Daniel Geisseler, Ph.D., Cooperative Extension Specialist  
 Elise Gornish, Ph.D., Cooperative Extension Specialist  
 Stephen Grattan, Ph.D., Water Relations Specialist  
 Peter Green Professional Research Engineer (*Civil & Environmental Engineering*)  
 Stephen Kaffka, Ph.D., Cooperative Extension Specialist (*Plant Science*)  
 Jeffrey P. Mitchell, Ph.D., Cooperative Extension Specialist (*Plant Sciences*)  
 A. Toby O'Geen, Ph.D., Cooperative Extension Specialist  
 Ken Tate, Ph.D., Cooperative Extension Specialist (*Plant Sciences*)

**Graduate Study.** The Soils and Biogeochemistry Graduate Group offers programs of study and research leading to the M.S. and Ph.D. degrees. The focus of Soils and Biogeochemistry is on the physical, chemical and biological processes occurring in soils of different landforms and ecosystems. The goal is to understand the complex processes of mass and energy flow that control agricultural and natural ecosystem functions, productivity, and sustainability. Investigations assess impacts and implications of natural processes and anthropogenic effects, such as climate change, on soil and ecosystem behavior and development. Examples include: fate and emission of greenhouse gases; soil carbon sequestration; fate and transport of native and applied chemicals; soil microbial ecology; nutrient uptake and management; nutrient cycling in managed and wildland ecosystems; pesticide and trace element adsorption on surfaces; mineral weathering; organic agriculture; bioavailability of toxics; soil erosion; conservation; ecosystem productivity and sustainability; and the study of soil evolution on the landscape. These studies are carried out within a framework of integrating applied chemical, physical, mathematical, and biological sciences.

**Graduate Advisers.** Randy Dahlgren, Ph.D.; Sanjai Parikh, Ph.D.

**Graduate Admissions Officer.** A. Toby O'Geen, Ph.D.

## Spanish and Portuguese

(College of Letters and Science)

Cecilia Colombi, Ph.D., Chairperson of the Department

**Department Office.** 215 Sproul Hall;  
 530-752-0835; <http://spanish.ucdavis.edu>

**Faculty**

Emilio Bejel, Ph.D., Professor  
 Leopoldo Bernucci, Ph.D., Professor  
 Robert Blake, Ph.D., Professor  
 Travis Bradley, Ph.D., Associate Professor  
 Cecilia Colombi, Ph.D., Professor  
 Cristina González, Ph.D., Professor  
 Robert Irwin, Ph.D., Professor  
 Michael Lazzara, Ph.D., Associate Professor  
 Adrienne Martín, Ph.D., Professor  
 Cristina Martínez-Carazo, Associate Professor  
 Robert Newcomb, Ph.D., Associate Professor  
 Ana Peluffo, Ph.D., Associate Professor  
 Claudia Sánchez Gutiérrez, Ph.D., Assistant Professor  
 John Slater, Ph.D., Associate Professor

**Emeriti Faculty**

Marta E. Altisen, Ph.D., Professor Emerita  
 Linda Egan, Ph.D., Professor Emerita  
 Norma López-Burton, M.A., Continuing Lecturer Emerita  
 Zunilda Gertel, Ph.D., Professor Emerita

Fabián A. Samaniego, M.A., Senior Lecturer

Emeritus

Hugo J. Verani, Ph.D., Professor Emeritus

**Affiliated Faculty**

Charles Oriel, Ph.D., Lecturer

**The Major Program**

The Spanish major program assures proficiency in all four language skills-speaking, understanding, reading, and writing-and acquaints students with the intellectual and cultural contributions of the Spanish-speaking world through a study of its language, literature, and cultural productions.

**The Program.** The department's lower division program gives students a solid foundation in the Spanish language, either through the traditional elementary and intermediate language series or through an accelerated three-course sequence of Spanish for native speakers. At the upper division level, students receive a broad introduction to basic concepts and the practice of literary and cultural criticism and to the four areas of study represented in the department's curriculum: Spanish linguistics, Spanish literature and culture, Latin-American literature and culture, and Latino literatures and cultures in the United States. Students are encouraged to work closely with the department's academic advisers in designing a program of studies tailored to their individual needs and interests. Many students combine the Spanish major with another major in the humanities or social sciences.

**Student Learning Outcomes.** Educational Objectives:

- **Linguistics.** Demonstrate knowledge of the Spanish speaking world's linguistic diversity through the comprehension of Spanish in a variety of situations, discursive modes and historical, regional or social variations. Demonstrates analytic, interpretative, and critical thinking skills; Spanish 111N, 113, 115/S, 116, 117, 118, 180.
- **Literature.** Demonstrate analytic, interpretative and critical thinking skills with respect to literary texts from Latin America, Spain, the United States and other countries in which there is a literary production in Spanish; Spanish 100/S, 130, 131N, 134A/B, 142 (Spain); 150N, 151, 157, 159/S (Latin America); 117, 174, 176, 177 (United States).
- **Culture.** Demonstrate cultural awareness with respect to the diversity of cultural products and manifestations produced in the Spanish speaking world (Latin America, Spain, the United States and other countries in which there is a cultural production in Spanish; Spanish 100/S, 141/S, 170/S, 174).
- **Film and Art.** Demonstrate analytic interpretative and critical thinking skills with respect to linguistics, literature and cultural studies.

**Career Alternatives.** The program, alone or in combination with other major programs, may lead to advanced study of the language or literature and culture of Spain and Spanish America, and to careers not only in teaching, but also in other professions such as library science, law, medicine, and in government, social service, business, or international relations.

**A.B. Major Requirements:**

UNITS

**Preparatory Subject Matter.....37**

Spanish 1, 2, 3, 21 or 21S, 22 or 22S, 23 or 23S, and 24 or 24S.....0.33  
 or Spanish 31, 32, 33.....0.15  
 Linguistics 1 .....4

**Depth Subject Matter .....41-44**

One course in each of the following five areas: .....19-20  
 Spanish 100, 100S, 141, 141S, 170 or 170S .....4  
 Spanish 111N, 115, or 116 .....3-4

Spanish 130, 131N, 134A or 142 .....4  
 Spanish 150N, 151, 157, 159 or 159S .....4  
 Spanish 117, 174, 176, or 177 .....4  
 Students planning to take Spanish 110 should do so at the beginning of the upper division sequence or concurrently with Spanish 100, 100S, 141, 141S, 170 or 170S.

Six elective courses to be chosen in consultation with the student's major adviser .....22-24

Students may, with the approval of their adviser, take up to two elective courses outside the Spanish department in such programs as:

*African American and African Studies:*  
*African American and African Studies*  
 107A, 180  
*Anthropology: Anthropology* 144  
*Art History: Art History* 151  
*Chicana/o Studies: Chicana/o Studies*  
 154, 155, 156, 160, 170, 171  
*Comparative Literature: Comparative Literature* 152, 165/S  
*Education: Education* 151, 152  
*History: History* 159, 160, 161A, 161B,  
 164, 165, 166A, 166B, 167, 168,  
 169A, 169B  
*Linguistics: Linguistics* 166  
*Native American Studies: Native American Studies* 120, 133A/B, 184  
 A maximum of six units of course 199 may be counted toward the major.  
 Course 199 cannot be used to replace regular departmental courses.

**Total Units for the Major .....45-81**

**Major Advisers.** Student Affairs Officer/Undergraduate Academic Coordinator; Laura Barrera, [ljbarerra@ucdavis.edu](mailto:ljbarerra@ucdavis.edu).

**Advising.** Given the great flexibility in the Spanish major, it is important that students design their programs in close consultation with their major adviser. This is especially important for students who intend to use their major as preparation for graduate study, for those who are planning a teaching career, and for those who wish to take advantage of our Education Abroad Program options.

**Minor Program Requirements:**

UNITS

**Spanish .....23-24**

One course in each of the following five areas:

Spanish 100, 100S, 141, 141S, 170, or 170S .....4  
 Spanish 111N, 115, or 116 .....3-4  
 Spanish 130, 131N, 134A, or 142 .....4  
 Spanish 150N, 151, 157, 159 or 159S .....4  
 Spanish 117, 174, 176, or 177 .....4  
 One upper division elective in Spanish .....4  
 Consult a departmental adviser if any of these courses are to be taken abroad.

**Honors Program.** Candidates for high or highest honors in Spanish must write a senior thesis under the direction of a faculty member. For this purpose, honors candidates must enroll in at least six units of Spanish 194H distributed over two quarters. Normally, a student will undertake the honors project during the first two quarters of the senior year; other arrangements must be authorized by the department chair. Only students who, at the end of their junior year (135 units), have attained a cumulative GPA of 3.500 in courses required for the major will be eligible for the honors program. The requirements for earning high and highest honors in Spanish are in addition to the regular requirements for the major in Spanish.

**Education Abroad Program Options.** The department encourages its majors to consider study in a Spanish-speaking country with our Education Abroad Program (EAP). It is now possible for our stu-

dents to complete significant portions of the Spanish major in the EAP centers at both the lower (Preparatory Subject Matter) and upper division levels through newly introduced options.

**UC Davis Quarter Abroad.** The Quarter Abroad Program offers programs in Mendoza, Argentina (fall quarter) and in Madrid, Spain (spring quarter). These programs aim at providing students with opportunities to increase their knowledge of the Spanish language and cultures by experiencing the life-learning challenges of living and studying abroad.

Students may earn 15-22 UC Davis units toward the Spanish major, minor, or foreign language requirement. Each program may offer an upper division course taught by the UC Davis Program Director focusing on history, culture and society.

For more information, contact C. Colombi or C. Martínez-Carazo or see <http://studyabroad.ucdavis.edu/programs/quarterabroad/>.

**Teaching Credential Subject Representative.** C. Colombi; see the Teaching Credential/M.A. Program on page 124.

**Graduate Study.** The Department offers courses leading to the M.A. degree in Spanish to students who have completed with distinction the A.B. degree in Spanish, or the equivalent. Candidates will be recommended for admission to graduate studies in Spanish provided they meet the requirements of the Graduate Studies office and the Department of Spanish. The Department also offers programs of study and research leading to the Ph.D. degree. Detailed information may be obtained by writing to the Chairperson or the Graduate Director of the Spanish Department.

**Graduate Adviser.** Mandy Bachman, [mlbachman@ucdavis.edu](mailto:mlbachman@ucdavis.edu).

**Prerequisite Credit.** Credit normally will not be given for a course if that course is the prerequisite of a course already successfully completed. Exceptions can be made by the Department Chairperson only.

## Courses in Portuguese (POR)

### Lower Division

#### 1. Elementary Portuguese (5)

Lecture/discussion—5 hours; laboratory—1 hour. Introduction to Portuguese grammar and development of all language skills in a cultural context with special emphasis on communication. Students who have successfully completed Portuguese 2 or 3 in the 10th or higher grade of high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed. GE credit: WC.—F. (F.)

#### 1A. Accelerated Intensive Elementary Portuguese (15)

Lecture/discussion—15 hours. Not open to students who have completed courses 1, 2 or 3. Intended for students who wish to complete three quarters of Portuguese 1, 2, and 3. GE credit: WC.

#### 2. Elementary Portuguese (5)

Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1 in the areas of grammar and development of all basic language skills in cultural context with special emphasis on communication. GE credit: WC.—W. (W.)

#### 3. Elementary Portuguese (5)

Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Continuation of course 2 in the areas of grammar and development of all basic language skills in cultural context with special emphasis on communication. GE credit: WC.—S. (S.)

#### 8. Elementary Portuguese Conversation (2)

Discussion—3 hours. Prerequisite: course 3. Not open to native speakers or upper division students. Designed to develop oral communication skills.

Emphasis on increasing vocabulary, improving listening comprehension, pronunciation, accuracy and grammar control. Practice of everyday situations. GE credit: WC.—W, S, Su. (W, S, Su.)

#### 21. Intermediate Portuguese (5)

Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 3. Review and develop the grammar, vocabulary, and composition acquired in first year Portuguese through exercises and reading of modern texts. GE credit: WC.—F. (F.) Bernucci

#### 22. Intermediate Portuguese (5)

Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 21. Continuation of course 21. Focus on more difficult grammar concepts and further composition practice. Development of all language skills through exercises and reading of modern texts. GE credit: WC.—W. (W.)

#### 23. Portuguese Composition I (4)

Lecture—3 hours; extensive writing. Prerequisite: course 22. Development of writing skills by way of reading, discussion, and analysis of authentic materials, literary texts, and videos. Selective review of grammar. Class activities include composition, journals, letters, individual and group projects. GE credit: WC, WE.—S. (S.)

#### 28. Intermediate Portuguese Conversation (2)

Discussion—3 hours. Prerequisite: course 8. Continuation of course 8. Designed to develop oral communication skills at a more advanced level. Practice in more complex situations.—W, Su. (W, Su.)

#### 31. Intermediate Portuguese for Spanish Speakers (4)

Lecture/discussion—3 hours; laboratory—1 hour. Development of linguistic and learning skills required for Spanish-speaking students in upper-division courses in Portuguese.

#### 98. Directed Group Study (1-5)

Prerequisite: consent of instructor and Department Chairperson. Directed group study primarily for lower division students.—F, W, S. (F, W, S.)

### Upper Division

#### 100. Principles of Luso-Brazilian Literature and Criticism (4)

Lecture—3 hours; term paper. Prerequisite: course 22 or 23 or consent of instructor. Principles of literary criticism applied to the study of fiction, poetry, and essays of major literary writers of the Luso-Brazilian world. GE credit: ArtHum | AH, WC, WE.—F. (F.) Bernucci, Newcomb

#### 111. The Structure of Portuguese: Sounds and Words (3)

Lecture/discussion—3 hours. Prerequisite: consent of instructor. Linguistic description of sound patterns of Portuguese and how those sounds can be used to form larger units, such as morphemes and words. Theoretical and practical comparisons with English and with other Romance languages. GE credit: SS.

#### 130. Survey of Luso-Brazilian Literature: 1500-1800 (4)

Lecture/discussion—3 hours; term paper. Prerequisite: course 22 or 23; 100. Overview of Luso-Brazilian literature, covering three major literary periods: Renaissance, Baroque, and Enlightenment. Attention to the concept of imitation and nativism. GE credit: AH, WC.—W. (W.)

#### 132. Portuguese Literature: Medieval and Renaissance (4)

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Overview of the origins of the Portuguese literature, spanning from the 13th C to the 16th C. Studies of lyrical and epic poetry, drama, and travel narratives. GE credit: AH, WC.

#### 134. Luis de Camões (4)

Lecture/discussion—3 hours; term paper. Prerequisite: course 22 or 31; 100. Overview of the greatest Renaissance Portuguese poet, Luis de Camões. Study his famous epic poem, Os Lusíadas, and a series of sonnets written by him. GE credit: AH, WC.

#### 141. Introduction to Luso-Brazilian Culture (4)

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 100 or consent of instructor. Introduction to history, geography, and culture of Portugal and Brazil. Art, history of ideas, and everyday cultural manifestations. Introduction to critical reading and textual analysis. Taught in Portuguese. GE credit: ArtHum, Div, Wrt | AH, WC.

#### 159. Special Topics in Luso-Brazilian Literature and Culture (4)

Lecture—3 hours; term paper. Prerequisite: course 3 or Spanish 24, 24S or 33. Special Topics in Luso-Brazilian Literature and Culture. May be repeated one time for credit. GE credit: ArtHum | AH, WC, WE.—Bernucci, Newcomb

#### 161. Luso-Brazilian Literature and Culture (4)

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Colonial Brazilian literature survey. Readings include 16th-18th centuries manuscripts and books of cultural importance in a society dominated by censorship and with no printing presses. Study of the role literary Academies played in the so called "culture of manuscripts." GE credit: ArtHum | AH, WC, WE.—Bernucci, Newcomb

#### 162. Introduction to Brazilian Literature (4)

Lecture/discussion—3 hours; term paper. Prerequisite: course 3, 31 or 31G. Narrative and poetic texts of the 19th and 20th centuries in Brazil. In-depth and comparative study of Romantic and (Neo) Naturalist movements as a forum for discussion about literary tradition and modernity in Latin America. GE credit: ArtHum | AH, WE.—Bernucci, Newcomb

#### 163. 20th C Masters in Brazilian Literature (4)

Lecture/discussion—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Overview of modern Brazilian literature from early 20th C to the poetry by João Cabral de Melo Neto and the Concretists (1960s), including European avant-garde movements and literary and cultural manifestos leading to a revolutionary body of literature. GE credit: ArtHum | AH, WC, WE.—Bernucci, Newcomb

#### 198. Directed Group Study (1-5)

Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.) GE credit: AH, WC, WE.—F, W. (F, W.) Bernucci

#### 199. Special Study for Advanced Undergraduates (1-5)

Independent study with professor for advanced undergraduate students, or honor thesis students. (P/NP grading only) Offered irregularly. GE credit: AH.

### Courses in Spanish (SPA)

**Course placement.** Students with two years of high school Spanish normally take Spanish 2, those with three years take Spanish 3, and those with four years take Spanish 21. It is recommended that transfer students who have successfully completed a two-year sequence at the junior college level continue their study by taking Spanish 24, 24S, 100, 100S, 141, 141S, 170, or 170S. Consult a departmental adviser.

### Lower Division

#### 1. Elementary Spanish (5)

Lecture/discussion—5 hours. Introduction to Spanish grammar and development of all language skills in a cultural context with special emphasis on communication. Not open for credit for students who have completed equivalent course 1S. Students who have successfully completed Spanish 2 or 3 in the 10th or higher grade of high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed. GE credit: ArtHum | AH, WC.—F, W, S, Su. (F, W, S, Su.)

**1A. Accelerated Intensive Elementary Spanish (15)**

Lecture/discussion—15 hours. Introduction to Spanish grammar and development of all language skills in a cultural context with emphasis on communication. Special 12-week accelerated, intensive summer session course combining the work of courses 1, 2 and 3. Not open to students who have completed equivalent courses 1, 1S, 2, 2S, 2V, 2Y, 3, 3S, 3V or 3Y. GE credit: ArtHum | WC.—Su. (Su.)

**15. Elementary Spanish (5)**

Lecture/discussion—5 hours; laboratory—1 hour. Introduction to Spanish grammar and development of all language skills in a cultural context with special emphasis on communication. Offered in a Spanish speaking country under the supervision of a UC Davis faculty/lecturer. Not open for credit to students who have completed course 1. GE credit: WC.—F, S. (F, S.)

**2. Elementary Spanish (5)**

Lecture/discussion—5 hours. Prerequisite: course 1 or 1S or the equivalent. Continuation of courses 1 and 1S in the areas of grammar and basic language skills. Not open for credit for students who have completed equivalent course 2S, 2V or 2Y. GE credit: ArtHum | AH, WC.—F, W, S, Su. (F, W, S, Su.)

**25. Elementary Spanish (5)**

Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 1 or 1S. Continuation of Spanish 1 in the areas of grammar and basic language skills. Offered in a Spanish speaking country under the supervision of UC Davis faculty/lecturer. Not open for credit to students who have completed course 2. GE credit: WC.—S. (F, S.)

**2V. Elementary Spanish (5)**

Web virtual lecture—3 hours; web electronic discussion—2 hours. Prerequisite: course 1 or 1S; or the equivalent. Continuation of course 1, 1S, or previous high school experience in the areas of grammar and basic language skills. Online format combining synchronous chatting with technologically based materials. Not open for credit to students who have taken equivalent course 2, 2S, 2Y, or higher. GE credit: ArtHum | AH, WC.—F, W, S, Su. (F, W, S, Su.)

**2Y. Elementary Spanish (5)**

Lecture/discussion—3 hours; web electronic discussion—2 hours. Prerequisite: course 1 or 1S. Continuation of course 1 or 1S in the areas of grammar and basic language skills. Hybrid format combining classroom instruction with technologically based materials. Not open for credit to students who have taken equivalent course 2, 2S, or 2V. GE credit: ArtHum | AH, WC.—F, W, S, Su. (F, W, S, Su.)

**3. Elementary Spanish (5)**

Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 2, 2S, 2V or 2Y. Completion of grammar sequence and continuing practice of all language skills using cultural texts. Not open for credit to students who have completed course 3S. GE credit: WC.—F, W, S, Su. (F, W, S, Su.)

**35. Elementary Spanish (5)**

Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 2, 2S, 2V, or 2Y. Completion of grammar sequence and continuing practice of all language skills using cultural texts. Offered in a Spanish speaking country under the supervision of UC Davis faculty. Not open for credit to students who have completed course 3. GE credit: WC.—F, S. (F, S.)

**3V. Elementary Spanish (5)**

Web virtual lecture—3 hours; web electronic discussion—2 hours. Prerequisite: course 2, 2S, 2V, or 2Y. Continuation of course 2, 2S, 2V or 2Y. Online format combining synchronous chatting with technologically based materials. Not open to students who have taken equivalent course 3, 3S, 3Y, or higher. GE credit: ArtHum | AH, WC.—W, Su. (W, Su.)

**3Y. Elementary Spanish (5)**

Lecture/discussion—3 hours; web electronic discussion—2 hours. Prerequisite: course 2, 2S, 2V or 2Y. Completion of grammar sequence and continuing

practice of all language skills using cultural texts. Hybrid format combining classroom instruction with technologically based materials. Not open to students who have taken equivalent course 3, 3S, or 3V. GE credit: ArtHum | AH, WC.—F, W, S. (F, W, S.)

**8. Elementary Spanish Conversation (2)**

Discussion—3 hours. Prerequisite: course 3; course 21 (concurrently) recommended. Not open to native speakers or upper division students. Designed to develop oral communication skills. Emphasis on increasing vocabulary, improving listening comprehension, pronunciation, accuracy and grammar control. Practice of everyday situations. GE credit: OL, WC.

**21. Intermediate Spanish (5)**

Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 3 or 3S. Review and develop the grammar, vocabulary and composition acquired in the first year through exercises and reading of modern texts. Students transferring from other institutions are recommended to start the second year program at this point. Not open for credit to students who have completed course 21S. GE credit: WC.—F, W, S. (F, W, S.)

**21S. Intermediate Spanish (5)**

Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 3, 3S, 3V or 3Y. Review and develop the grammar, vocabulary and composition acquired in the first year through exercises and reading of modern texts. Students transferring from other institutions are recommended to start the second year program at this point. Not open for credit to students who have completed course 21. GE credit: WC.—F. (F.)

**21V. Intermediate Spanish (5)**

Web Virtual Lecture—3 hours; web electronic discussion—2 hours. Prerequisite: course 3, 3Y, 3V or the equivalent from previous high school language experience. Continuation of course 3, 3V, 3Y, 3S, or previous high school experience in the areas of grammar and intermediate language skills. Online format combining synchronous chatting with technologically based materials. Not open for credit to students who have taken equivalent course 21, 21Y or 21S. GE credit: AH, OL, WC, WE.

**21Y. Intermediate Spanish (5)**

Lecture/discussion—3 hours; web electronic discussion—2 hours. Prerequisite: course 3, 3S, 3V or 3Y. Continuation of courses 3 or 3V in the areas of grammar and basic language skills. Hybrid format combining classroom instruction with technologically based materials where learning takes place both face-to-face and online. Not open to students who have taken course 21 or 21S. GE credit: WC.—F, W, S. (F, W, S.)

**22. Intermediate Spanish (5)**

Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 21 or 21S or 21V or 21Y. Continuation of course 21 and 21S. Focus on more difficult grammar concepts and further practice on composition. Development of all language skills through exercises and reading of modern texts. Not open for credit to students who have completed course 22S. GE credit: WC.—F, W, S. (F, W, S.)

**22S. Intermediate Spanish (5)**

Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 021, 021S, 021V or 021Y. Continuation of course 21 and 21S. Focus on more difficult grammar concepts and further practice on composition. Development of all language skills through exercises and reading of modern texts. Offered in a Spanish speaking country under the supervision of UC Davis faculty. Not open for credit to students who have completed course 22. GE credit: WC.—F. (F.)

**22V. Intermediate Spanish (5)**

Lecture/discussion—3 hours; web electronic discussion—2 hours. Prerequisite: course 21, 21Y, 21S, 21V or equivalent from previous high school language experience. Continuation of course 21, 21S, or 21V in the areas of grammar and basic language skills. Online format combining synchronous chatting

with technologically-based materials. Not open to students who have taken course 22 or 22S. Offered irregularly. GE credit: WC.—F, W, S, Su. (F, W, S, Su.)

**22Y. Intermediate Spanish (5)**

Lecture/discussion—3 hours; web electronic discussion—2 hours. Prerequisite: course 21, 21S, 21V or 21Y. Continuation of course 21, 21S, or 21V in the areas of grammar and basic language skills. Online format combining synchronous chatting with technologically-based materials. Not open to students who have taken equivalent course 22, 22S or 22V. Offered irregularly. GE credit: ArtHum | AH, WC.—F, W, S. (F, W, S.)

**23. Spanish Composition I (4)**

Lecture—3 hours; extensive writing. Prerequisite: course 22, 22S, 22V or 22Y. Development of writing skills by way of reading, discussion, and analysis of authentic materials, literary texts, and videos. Selective review of grammar. Composition, journals, individual and group projects. Not open for credit to students who have completed 23S. GE credit: ArtHum | AH, WC, WE.—F, W, S, Su. (F, W, S, Su.) Colombi

**23S. Spanish Composition I (4)**

Lecture—3 hours; extensive writing. Prerequisite: course 22, 22S, 22V or 22Y. Development of writing skills by way of reading, discussion, and analysis of authentic materials, literary texts, and videos. Selective review of grammar. Composition, journals, individual and group projects. Course is taught in a Spanish speaking country. Not open for credit to students who have completed equivalent course 23. GE credit: ArtHum | AH, WC, WE.—F. (F.) Colombi

**24. Spanish Composition II (4)**

Lecture—3 hours; extensive writing. Prerequisite: course 23 or 23S. Development of advanced level writing skills, with emphasis on how to write argumentative prose, essays, and research papers. Introduction to the analysis of literary genres. Compositions, journals, individual and group projects. Not open for credit for students who have completed equivalent course 24S. GE credit: ArtHum | AH, WC, WE.—F, W, S. (F, W, S.) Colombi

**24S. Spanish Composition II (4)**

Lecture—3 hours; extensive writing. Prerequisite: course 23 or 23S. Development of advanced level writing skills, with emphasis on how to write argumentative prose, essays, and research papers. Introduction to the analysis of literary genres. Compositions, journals, individual and group projects. Not open for credit to students who have completed equivalent course 24. GE credit: ArtHum | AH, WC, WE.—F. (F.) Colombi

**28. Intermediate Spanish Conversation (2)**

Discussion—3 hours. Prerequisite: course 8 or 22. Continuation of course 8. Designed to develop oral communication skills at a more advanced level. Practice in more complex situations. (Former course 9.) GE credit: OL, WC.

**31. Intermediate Spanish for Native Speakers I (5)**

Lecture/discussion—3 hours; tutorial—1 hour; extensive writing. Prerequisite: course 3 or the equivalent or consent of instructor. First course of a three-quarter series designed to provide bilingual students whose native language is Spanish with the linguistic and learning skills required for successfully completing upper division courses in Spanish. Intensive review of grammar and composition. GE credit: ArtHum | AH, OL, WC, WE.—F. (F.)

**32. Intermediate Spanish for Native Speakers II (5)**

Lecture/discussion—3 hours; tutorial—1 hour; extensive writing. Prerequisite: course 31; consent of instructor. Continuation of Spanish 31, intensive review of grammar and composition. Development of all language skills through reading of modern texts, presentation/discussion of major ideas, vocabulary expansion, and writing essays on topics discussed.

cussed. Designed for students whose native language is Spanish. GE credit: ArtHum | AH, OL, WC, WE.—W. (W.)

### **33. Intermediate Spanish for Native Speakers III (5)**

Lecture/discussion—3 hours; tutorial—1 hour; extensive writing. Prerequisite: course 32; consent of instructor. Development of writing skills, with emphasis on experimenting with various writing styles: analytical, argumentative, and creative. Analytical review of literary genres. Written essays will be assigned. Students will develop a research paper. Designed for students whose native language is Spanish. GE credit: ArtHum | AH, OL, WC, WE.—S. (S.)

### **98. Directed Group Study (1-5)**

Prerequisite: consent of instructor and Department Chairperson. Primarily for lower division students. (P/NP grading only.)—F, W, S. (F, W, S.)

### **99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S. (F, W, S.)

## **Upper Division**

### **100. Principles of Hispanic Literature and Criticism (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 24 or 24S or 33. Principles of literary criticism applied to the study of fiction, drama, poetry, and essay of major literary writers of the Hispanic world. Not open for credit to students who have completed course 100S. GE credit: ArtHum | AH, OL, WC, WE.—F, W, S. (F, W, S.)

### **100S. Principles of Hispanic Literature and Criticism (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 24 or 33. Principles of literary criticism applied to the study of fiction, drama, poetry and essay of major literary writers of the Hispanic world. Offered in a Spanish speaking country under the supervision of a UC Davis faculty/lecturer. Not open for credit to students who have completed course 100. GE credit: ArtHum | AH, OL, WC, WE.—S.

### **110. Advanced Spanish Composition (4)**

Lecture—3 hours; frequent writing assignments. Prerequisite: course 24 or 33. Practice in expository writing with emphasis on clarity and idiomatic expression. Practical application and review of selected grammar topics. (Part of former courses 110A and 110B.) GE credit: WE.

### **111N. The Structure of Spanish: Sounds and Words (3)**

Lecture—3 hours. Prerequisite: course 24 or 33, or consent of instructor; Linguistics 1 recommended. Linguistic description of the sound patterns of Spanish and how those sounds can be used to form larger units, such as morphemes and words. Theoretical and practical comparisons with English and with other Romance languages. (Former course 132.) GE credit: SocSci | SS.—F, W, S. (F, W, S.) Bradley

### **112N. The Structure of Spanish: Words and Phrases (3)**

Lecture—3 hours. Prerequisite: course 111N or consent of instructor. A study of Spanish word and phrase structure, with special emphasis on the constituent structure of noun and verb phrases. Theoretical and practical comparisons with English and with other Romance languages. (Former course 131.) GE credit: SocSci | SS.—Blake, Colombi

### **113. Spanish Pronunciation (4)**

Lecture—3 hours; term paper. Prerequisite: course 24 or 33, or consent of instructor; Linguistics 1 recommended. The sound structure of modern Spanish; theoretical analysis of selected problems in pronunciation. Strongly recommended for prospective teachers of Spanish. GE credit: SocSci | SS.—F, W, S. (F, W, S.) Bradley

### **114N. Contrastive Analysis of English and Spanish (4)**

Lecture—3 hours; extensive writing. Prerequisite: course 24 or 33, or consent of instructor; course 111N and course 112N recommended. Contrastive analysis of English and Spanish, error analysis, introduction to structuralist and transformational linguistics. Individual and group conferences. (Former course 137.) GE credit: SocSci | SS.—Colombi

### **115. History of the Spanish Language (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 24 or 33, or consent of instructor; Linguistics 1 recommended. The Spanish language from its roots in spoken Latin to modernity. Emphasis on the close relationship between historical events and language change, and the role that literature plays in language standardization. Not open for credit to students who have completed course 115S. GE credit: ArtHum or SocSci | AH or SS.—Blake

### **115S. History of the Spanish Language (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 24 or 33, or consent of instructor; Linguistics 1 recommended. The Spanish language from its roots in spoken Latin to modernity. Emphasis on the close relationship between historical events and language change, and the role that literature plays in language standardization. Offered in a Spanish-speaking country under the supervision of a UC Davis faculty/lecturer. Not open for credit to students who have completed course 115. GE credit: ArtHum or SocSci | AH or SS.

### **116. Applied Spanish Linguistics (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 24 or 33, or consent of instructor; Linguistics 1 recommended. Exploration of the major theoretical and practical issues concerning learning Spanish as a second language. For students interested in teaching Spanish as a career. Not open to students who have taken course 116S. GE credit: SocSci | SS.—Blake, Colombi, Sánchez Gutiérrez

### **116S. Applied Spanish Linguistics (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 24 or 33, or consent of instructor; Linguistics 1 recommended. Exploration of the major theoretical and practical issues concerning learning Spanish as a second language. For students interested in teaching Spanish as a career. Offered in a Spanish speaking country, in Spanish, under the supervision of UC Davis faculty. Not open to students who have taken course 116. GE credit: SocSci | SS.—F. (F.) Colombi

### **117. Teaching Spanish as a Native Tongue in the U.S.: Praxis and Theory (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 24 or 33, or consent of instructor; Linguistics 1 recommended. Designed for students interested in teaching Spanish to native speakers. Focus on cultural diversity of the Spanish speaking population in the United States; applied language teaching methodologies in the context of teaching Spanish to native speakers at different levels. GE credit: OL.—Colombi

### **118. Topics in Spanish Linguistics (4)**

Lecture—3 hours; term paper. Prerequisite: course 111N or consent of instructor. A study of specialized topics in Spanish linguistics, for example: language and use; text and context; language and society; bilingualism; Spanish dialectology; syntax and semantics. May be repeated one time for credit when topic differs. GE credit: SocSci | SS.—F, W, S. (F, W, S.)

### **123. Creative Writing in Spanish (4)**

Discussion—4 hours. Prerequisite: course 24 or 33 or consent of instructor. Intensive writing of poetry or fiction in Spanish or in a bilingual (Spanish/English) format. Students will write both in prescribed forms and in experimental forms of their own choosing. GE credit: WE.

### **130. Survey of Spanish Literature to 1700 (4)**

Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Survey of Spanish literature (narrative, poetry and drama) to 1700. Emphasis on the multicultural birth of the Spanish culture, the formation and growth of the Spanish language and letters through its written records and the literature of the early period. GE credit: ArtHum | AH, WC.—Martín

### **131N. Survey of Spanish Literature: 1700 to Present (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Survey of modern Spanish literature, providing an overview of main literary movements (romanticism, realism, naturalism, modernism, avant-garde). Emphasis on the philosophical and historical background and on the European context for modern Spanish literature. (Part of former courses 104A and 104B.) GE credit: SocSci | AH, WC.

### **132. Golden Age Drama and Performance (4)**

Lecture—1.5 hours; performance instruction—1.5 hours. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Limited enrollment. Golden Age drama: text and performance. Study of Spanish Baroque drama as performance art. Close reading of plays and related aspects of seventeenth-century theater: theatrical spaces, staging, performance, actors, public, language, costumes. Final project is performance of a play. May be repeated two times for credit. Offered in alternate years. GE credit: ArtHum | AH, VL, WC.—Martín, Slater

### **133N. Golden Age Literature of Spain (4)**

Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Introduction to the study of the principal authors and literary movements of 16th and 17th-century Spain and Spanish American colonial literature. May be repeated three times for credit with consent of instructor. GE credit: ArtHum | AH, OL, WC, WE.—Martín, Slater

### **134A. Don Quijote I (4)**

Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Critical interpretation of Don Quijote Part One by Cervantes. Focused study of key elements within the socio-cultural context of Golden Age Spain. Don Quijote as prototype for the modern novel. GE credit: ArtHum | AH, WC, WE.—Martín

### **134B. Don Quijote II (4)**

Lecture—3 hours; term paper. Prerequisite: course 134A. Critical interpretation of Don Quijote Part Two by Cervantes. Focused study of key elements within the socio-cultural context of Golden Age Spain. Don Quijote as prototype for the modern novel. GE credit: ArtHum | AH, WC, WE.—Martín

### **135N. Spanish Romanticism (4)**

Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Romanticism as a philosophical concept, and as a literary movement in Spain, with emphasis on its distinctive, specific "romantic" qualities and its literary expression in five leading authors of the early nineteenth century. (Former course 114.) GE credit: ArtHum | AH, WC.

### **136N. The Spanish Novel of the 19th Century (4)**

Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Literary realism in Spain, focusing on Leopoldo Alas (Clarín), Emilia Pardo Bazán and Benito Pérez Galdós unique characteristics of Spanish realism and its historical roots in Cervantes and the picaresque. GE credit: ArtHum | AH, WC, WE.

### **137N. Twentieth-Century Spanish Fiction (4)**

Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Study of the main literary trends and authors of the modern Span-

ish novel and short story. Selected works by Unamuno, Valle-Inclán, Sender, Cela, Matute, Ayala and others. GE credit: ArtHum | AH, WC, WE.

### **138N. Modern and Contemporary Spanish Poetry (4)**

Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Study of the main literary trends and authors of modern and contemporary Spanish poetry. Selected works by Machado, Juan Ramón Jiménez, García Lorca, Guillén, Aleixandre, Hernández Hierro and others. (Former course 120C.) Offered in alternate years. GE credit: ArtHum | AH, OL, WC.

### **139. Modern Spanish Theater (4)**

Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Study of the main dramatic trends and playwrights of modern Spanish theater. Selected works by Valle Inclán, García-Lorca, Mihura, Buero-Vallejo, Arribal and others. Offered in alternate years. GE credit: ArtHum, Div | AH, WC.

### **140N. Modern Spanish Essay (4)**

Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Ortega, Unamuno and the modern Spanish essay. Their concept of Spain and their relations with other movements and thinkers. GE credit: ArtHum | AH, WC, WE.

### **141. Introduction to Spanish Culture (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 24, 24S, or 33. Introduction to history, geography and culture of Spain. Art, history of ideas, and everyday cultural manifestations. Introduction to critical reading and textual analysis. Not open for credit to students who have completed course 141S. GE credit: ArtHum, Div | AH, VL, WC.—González, Martínez-Carazo

### **141S. Introduction to Spanish Culture (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 24, 24S, or 33. Introduction to history, geography and culture of Spain. Art, history of ideas, and everyday cultural manifestations. Introduction to critical reading and textual analysis. Offered in a Spanish speaking country under the supervision of UC Davis faculty. Not open for credit to students who have completed course 141. GE credit: ArtHum, Div | AH, VL, WC.—S. (S.) Martínez-Carazo

### **142. Special Topics in Spanish Cultural and Literary Studies (4)**

Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Special topics in the study of Spanish literature and culture. May be repeated two times for credit. GE credit: ArtHum | AH, OL, WC, WE.—González, Martín, Martínez-Carazo, Slater

### **143. Spanish Art (4)**

Lecture—3 hours; term paper or discussion—1 hour. Spanish art and the different historical, sociological and political manifestations that frame it. History of art, including Paleolithic, Roman, Visigothic, Romanesque, Goth, Renaissance, Baroque, Neoclassic and Contemporary art. GE credit: ArtHum | AH, VL, WC.—S. (S., Su.) Martínez-Carazo

### **144. Topics in Spanish Cultural Studies (4)**

Lecture—3 hours; project. Prerequisite: course 24, 24S, or 33. Study of specific historical tendencies in Spanish culture(s) from the Romans to the present. Sources studied may include literature, film, art, journalism, and performance. Approaches to material may address issues of aesthetics, politics, identity, and globalization. May be repeated one time for credit. GE credit: ArtHum | AH, WC.—González, Martínez-Carazo

### **147. Anglos, Latinos and the Spanish Black Legend: The Origins and Educational Implications of Anti-Hispanic Prejudice (4)**

Lecture—3 hours; field work; term paper. Examination of Anti-Hispanic prejudice in the United States focusing on the "Black Legend," a 16th Century anti-Spanish myth underpinning the doctrine of "Manifest Destiny." Exploration of the Legend's presence in

contemporary American society through interviews and analysis of school textbooks. (Same course as Education 147.) GE credit: ArtHum, Div, Wrt | ACGH, AH, DD, WE.—González

### **148. Cinema in the Spanish-Speaking World in Translation (4)**

Lecture—3 hours; film viewing—3 hours. Prerequisite: course 24 or 24S or 33. Analysis of the culture of the Spanish-speaking world through film in translation. Emphasis on the cultural information illustrated by the films; no prior knowledge of cinematography required. Films with subtitles. Not open for credit to students who have completed Spanish 148S. GE credit: ArtHum, Div | AH, VL, WC.—Martínez-Carazo

### **148S. Cinema in the Spanish-Speaking World in Translation (4)**

Lecture—3 hours; film viewing—3 hours. Prerequisite: course 24 or 33. Analysis of the culture of the Spanish-speaking world through film in translation. Emphasis on the cultural information illustrated by the films; no prior knowledge of cinematography required. Films with subtitles. Offered in a Spanish speaking country, in Spanish, under the supervision of UC Davis faculty. Not open for credit to students who have completed course 148. GE credit: ArtHum, Div | AH, VL, WC.—F. S. (F, S.)

### **149. Latin-American Literature in Translation (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: English 3 or the equivalent. Reading, lectures and discussions in English of works by Borges, Cortázar, Fuentes, García Márquez, Paz and others. May not be counted toward the major in Spanish. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Newcomb

### **150N. Survey of Latin American Literature to 1900 (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Latin American literature from preconquest texts and the chronicles of the Conquest to romanticism and modernism. Reading selections include fiction, poetry, drama and essays. GE credit: ArtHum | AH, WC.—Bernucci

### **151. Survey of Latin American Literature 1900 to Present (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Latin American literature from 1900 to the present. Reading selections include fiction, poetry, drama, essays, testimonio, etc. GE credit: ArtHum | AH, WC.—Bejel, Irwin, Lazzara, Peluffo

### **151N. Survey of Spanish-American Literature 1900 to Present (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100. Spanish-American literature from Modernism to the present. Reading selections include fiction, poetry, drama, and essays. (Former course 105B.) GE credit: ArtHum | AH, WC.—Bejel

### **153. Latin American Short Story (4)**

Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. The evolution of the Latin American short story from the 19th century to the present. Emphasis on the contemporary period. GE credit: ArtHum | AH, WC.—Peluffo

### **154. Latin American Novel (4)**

Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Evolution of the Latin American novel from the 19th century to the present. Emphasis on significant contemporary works. GE credit: ArtHum | AH, WC.—(W.) Bejel, Bernucci, Newcomb

### **155. Mexican Novel (4)**

Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Evolution of the Mexican novel from the 19th century to the present. Emphasis on the narrative of the Revolution and significant contemporary works. GE credit: ArtHum | AH, WC.

### **156. Latin American Literature of the Turn of the 20th Century (4)**

Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Modernism as an authentic expression of Latin American literature and its influence on 20th-century poetry and prose. In depth analysis of the works of Dávila and other major writers of the era. GE credit: ArtHum | AH, WC.—Peluffo

### **157. Great Works of Latin American Literature/Culture (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Study of major works of Latin American literature/culture and their cultural and literary milieus. May include novels, poetry, film, etc. Works may be analyzed in terms of style, influence, cultural significance, political importance, and/or commercial success. GE credit: ArtHum | AH, WC.—Bejel, Bernucci, Irwin, Lazzara, Peluffo

### **158. Latin American Poetry: From Vanguardism to Surrealism and Beyond (4)**

Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Study of vanguardism, surrealism, and more recent movements of Latin American poetry. An in-depth analysis of the works of such major poets as Neruda, Vallejo, and Paz. GE credit: ArtHum | AH, WC.—Bejel, Bernucci

### **159. Special Topics in Latin American Literature and Culture (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: any one of the following: course 100, 100S, 141, 141S, 170 or 170S. Special topics in the study of Latin American literature and culture. May be repeated one time for credit when topic or subject differs; students may take any SPA 159 course two times total in combination. GE credit: ArtHum | AH, WC.—Peluffo

### **159S. Special Topics in Latin American Literature and Culture (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: any one of the following: course 100, 100S, 141, 141S, 170 or 170S. Special topics in the study of Latin American literature and culture. Offered in a Spanish speaking country under the supervision of UC Davis faculty. May be repeated one time for credit when topic or subject differs; students may take any SPA 159 course two times total in combination. GE credit: ArtHum | AH, WC.—F.

### **159Y. Special Topics in Latin American Literature and Culture (4)**

Web virtual lecture—3 hours; lecture/discussion—1 hour. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Special topics in the study of Latin American literature and culture. Hybrid format combining classroom instruction with technologically based materials. May be repeated one time for credit when topic or subject differs; students may take any Spanish 159 course two times total in combination. GE credit: ArtHum | AH, WC.—F, W, S, Su. (F, W, S, Su.) Bejel, Bernucci, Egan, Irwin, Lazzara, Peluffo, Lazarra

### **160. Latin American Women Writers in Translation (4)**

Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Latin American women writers from the 19th and 20th centuries. Recent theoretical approaches to literature by women in Latin America. Discussions in English of works by Matto de Turner, Avellaneda, Storni, Ocampo, Agustini, Mistral, Castellanos, and others. GE credit: ArtHum, Div, Wrt | AH, WC.—Peluffo

### **170. Introduction to Latin American Culture (4)**

Lecture—3 hours; term paper. Prerequisite: course 24, 24S or 33. Introduction to history, geography and culture of Latin America. Multiple genres of cultural production and representation, with a focus on cultural diversity and regional difference. Introduction to critical reading and textual analysis. Not

open for credit for students who have completed course 170S. GE credit: ArtHum, Div | AH, VL, WC, WE.—F. (F.) Bejel, Irwin, Lazzara, Peluffo

### **170S. Introduction to Latin American Culture (4)**

Lecture—3 hours; project. Prerequisite: course 24, 24S or 33. Introduction to history, geography and culture of Latin America. Multiple genres of cultural production and representation, with a focus on cultural diversity and regional difference. Introduction to critical reading and textual analysis. Not open for credit for students who have completed course 170. GE credit: ArtHum, Div | AH, VL, WC, WE.—F. (F.) Colombi

### **171. Music from Latin America (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Examination of music from Latin America. Characteristic music (i.e. tango, bossa nova, salsa, musica motena, musica andina) as well as its implications in other musical genres. Taught in Spanish. Not open to students who taken course 171S or Music 127. (Same course as Music 127) May be repeated one time for credit when content differs. GE credit: ArtHum | AH, WC.—Irwin, Ortiz

### **171S. Music from Latin America (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Examination of music from Latin America. Characteristic music (i.e. tango, bossa nova, salsa, musica motena, musica andina) as well as its implications in other musical genres. Taught in Spanish and in a Spanish speaking country under the supervision of UC Davis faculty. Not open to students who have taken course 171 or Music 127. GE credit: ArtHum | AH, WC.

### **172. Mexican Culture (4)**

Lecture—3 hours; term paper or discussion—1 hour or term paper. Prerequisite: course 24, 24S or 33. Study of Mexican culture through a diversity of cultural expression, including elite, popular and mass media culture. Focus on national icons and archetypes, multiculturalism, transnationalism. May be repeated once for credit. GE credit: ArtHum, Div | AH, VL, WC.—Irwin

### **173. Cinema and Latin American Culture (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 24, 24S, or 33. Understanding Latin American cultures through cinema. History and critical analysis of Latin American film. Focus on a national cinematic tradition. Comparative experiences in different parts of Latin America and/or a particular era. Conducted entirely in Spanish. May be repeated one time for credit. GE credit: ArtHum, Div | AH, VL, WC.—Irwin

### **174. Chicano Culture (4)**

Lecture—3 hours; term paper/discussion—1 hour. Prerequisite: course 24 or 33. An interdisciplinary survey of Chicano culture. Topics include literature, art, folklore, oral tradition, music, politics, as well as everyday cultural manifestations. Conducted in Spanish. (Former course 124.) GE credit: ArtHum, Div | ACGH, AH, DD.

### **175. Topics in Spanish American Cultural Studies (4)**

Lecture—3 hours; project—1 hour. Prerequisite: course 24, 24S, or 33. Specific historical tendencies and issues in Latin American culture(s) from pre-columbian times to present. Studies of literature, film, art, journalism and performance. Focus on issues of aesthetics, politics, identity, and globalization. May be repeated once for credit if content differs. GE credit: ArtHum, Div | AH, VL, WC, WE.—Bejel, Irwin, Peluffo, Lazzara

### **176. Literature in Spanish Written in the United States (4)**

Lecture—3 hours; term paper. Prerequisite: course 24 or 33. Survey of the literary and cultural contributions of the main Spanish-speaking populations present in the U.S.: Chicanos, Puerto Ricans, Cuban-Americans, Central Americans, and other Latinos. GE credit: ArtHum, Div | ACGH, AH, DD.—Alarcón

### **177. California and Latin America (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 24, 24S or 33. Interdisciplinary survey on the relationship between California and Latin America (1500s-present). Latin American representations of California and Californian representations of Latin America, as well as borderlands texts, with a special focus on Mexican-American perspectives. Conducted in Spanish. GE credit: ACGH, DD.—Irwin

### **178A. Spanish for the Professions (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 24, 24S or 33. For students with an advanced level of Spanish interested in the use of Spanish in the health care, legal and law enforcement and marketing and business professions. Field trips documenting the use of Spanish in the public context. GE credit: ArtHum or SocSci | AH or SS, DD, OL, WE.—Colombi

### **179. Science and Politics of the Human Body in the Spanish-Speaking World (4)**

Lecture—3 hours; term paper or discussion—1 hour. Interaction between the interpretations of scientific ideas, philosophical issues, and politics concerning the human body in the Spanish-speaking world through different historical periods. Not open to students who have taken equivalent course 179Y. GE credit: ArtHum or SciEng or SocSci | AH or SE or SS.—F, W, S. (F, W, S.) Bejel, Slater

### **179Y. Science and Politics of the Human Body in the Spanish-Speaking World (4)**

Web virtual lecture—2 hours; discussion—2 hours. Interaction between the interpretations of scientific ideas, philosophical issues, and politics concerning the human body in the Spanish-speaking world through different historical periods. Not open to students who have taken equivalent course 179. GE credit: ArtHum or SciEng or SocSci | AH or SE or SS.—F, W, S. (F, W, S.) Bejel, Slater

### **180. Senior Seminar in Spanish Linguistics (4)**

Seminar—3 hours; term paper. Prerequisite: senior standing; a major in Spanish or consent of instructor. Limited enrollment. Group study of a special topic drawn from Spanish linguistics. May be repeated one time for credit. GE credit: ArtHum or SocSci | AH or SS, OL, WE.—Blake, Bradley, Colombi

### **181. Senior Seminar in Spanish Literature/Culture (4)**

Seminar—3 hours; term paper—1 hour. Prerequisite: senior standing; a major in Spanish or consent of instructor. Limited enrollment. Group study of a special topic drawn from Spanish literary or cultural studies. Independent research project. May be repeated one time for credit if content differs. GE credit: ArtHum | AH, OL, WE.—González, Martin, Martínez-Carazo, Slater

### **182. Senior Seminar in Latin American Literature/Culture (4)**

Seminar—3 hours; term paper—1 hour. Prerequisite: senior standing; a major in Spanish or consent of instructor. Limited enrollment. Group study of a special topic drawn from Latin American literary or cultural studies. Independent research project. May be repeated one time for credit if content differs. GE credit: ArtHum | AH, OL, WC, WE.—Bejel, Irwin, Lazzara, Peluffo

### **192I. Internship in Spanish (1-12)**

Independent study—3-36 hours. Prerequisite: course 23; junior standing; major in Spanish, Chicano Studies, or a related field; consent of instructor. Internships in fields where Spanish language skills can be used and perfected (teaching, counseling, translating-interpreting). May be repeated up to 8 units for credit. Units will not count toward the Spanish major. (P/NP grading only.)—F, W, S. (F, W, S.)

### **194H. Special Study for Honors Students (1-5)**

Independent Study—3-15 hours. Prerequisite: Senior standing and qualification for the Spanish honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on

a topic in Spanish literature, civilization, or language studies. May be repeated for up to 8 units of credit. (P/NP grading only.) GE credit: AH, WC, WE.—F, W, S. (F, W, S.)

### **197T. Tutoring in Spanish (1-4)**

Tutorial—1-4 hours. Prerequisite: upper division standing and permission of the chair. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit for a total of 6 units. (P/NP grading only.)—F, W, S. (F, W, S.)

### **197TC. Tutoring in the Community (2-4)**

Tutorial—2-4 hours. Prerequisite: upper division standing and permission of the chair. Tutoring in public schools under the guidance of a regular teacher and supervision by a departmental faculty member. May be repeated for credit for a total of 6 units. (P/NP grading only.)—F, W, S. (F, W, S.)

### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.) GE credit: AH, WC, WE.—F, W, S. (F, W, S.)

### **199. Special Study for Advanced Undergraduates (1-5)**

May be repeated for up to 6 units of credit (P/NP grading only.) GE credit: AH, WC, WE.—F, W, S. (F, W, S.)

## **Graduate**

### **201. Literary Theory I (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Basic theories and practical approaches to modern and contemporary Hispanic literature. Emphasis on formalism, poststructuralism, socio-cultural discourses, and ideologies.—Bejel

### **202. Literary Theory II (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Major contemporary critical theories including recent, innovative approaches to Hispanic literature and culture. Readings from Semiotics and Deconstructionism to Psychological and Socio-ideological approaches. Emphasis on Postmodern and Neo-colonial discourse.—Bejel, Martín

### **203. Research Methodologies (1)**

Seminar—2 hour. Introduction to the range of scholarly research methodologies currently being realized in Spanish linguistics, literary and cultural studies: archival research, textual analysis, discourse analysis, statistics for linguistics, etc.; introduction to scholarly writing (MLA style) and scholarly publishing. (S/U grading only.)—Bejel, Bernucci, Blake, Carazo, Colombi, Irwin, Martín, Martinez-Lazzara, Newcomb, Peluffo

### **205. Spanish Phonology (4)**

Seminar—3 hours; term paper. Prerequisite: some knowledge of phonetics is required and consent of instructor; Linguistics 109 and 139 highly recommended. Analyzes the sound patterns of Spanish from both linear and non-linear perspectives. Students will develop a clear understanding of what phonology is and the nature of Spanish phonology, as defined by modern linguistic analysis.—Bradley

### **206. Spanish Syntax (4)**

Seminar—3 hours; term paper. Prerequisite: Linguistics 140 and 165. An examination of Spanish word order within the framework of general linguistic theory. The student will investigate how to write a grammar of Spanish with particular attention to the structure of noun and verb clauses.—Blake

### **207. History of the Spanish Language (4)**

Seminar—3 hours; term paper. Prerequisite: Latin 1. (Former course 220A.)—Blake

### **208. Old Spanish Texts (4)**

Seminar—3 hours; term paper. Prerequisite: course 207. An in-depth linguistic examination of Old Spanish texts from the 12th to the 15th centuries, with particular attention to the significance of orthographic changes.—Blake

**211. Hispanic Dialectology (4)**

Seminar—3 hours; term paper. Prerequisite: course 220 or consent of instructor. Descriptive and historical study of the distinctive features of Peninsular and American Spanish dialects. (Former course 221.)

**212. Applied Linguistics (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing and courses 215 and 216 recommended. Focuses on the relevant linguistic aspects of teaching Spanish. Designed for graduate students who have an interest in second-language learning and teaching.—Blake, Colombe

**215. Special Topics in Hispanic Linguistics (4)**

Seminar—3 hours; term paper. Prerequisite: consent of instructor; courses 205 and 206 recommended. Specialized topics in Hispanic linguistics (e.g., pragmatics, sociolinguistics, topics in syntax, semantics, or diachronic studies). May be repeated for credit when topic differs.—Blake, Bradley, Colombe, Sánchez Gutiérrez

**220. Catalan Language and Culture (4)**

Lecture/discussion—3 hours; laboratory—1 hour. Prerequisite: good command of Spanish, Portuguese, French or Italian and graduate level of studies in any of these languages; consent of instructor. Open to advanced undergraduate students, with notions of Catalan, can be admitted with consent of instructor; designed for graduate students. Foundation for the acquisition of Catalan oral, reading and elementary writing level skills for students of Spanish (Iberianists or Hispanists), with the capacity to interpret educated written language. Emphasis on weekly review of grammar and all language skills.

**222. Critical Approaches to Spanish Literature I: Prose and Essay (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Critical approaches to Spanish narrative and essay. May be repeated two times for credit when topic differs.—Martín

**223. Critical Approaches to Spanish Literature II: Poetry and Drama (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Critical approaches to Spanish poetry and drama. May be repeated two times for credit when topic differs.—Martín

**224. Studies of a Major Writer, Period, or Genre in Spanish Literature (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Artistic development of a major Spanish writer and his/her intellectual and literary milieu or study of a special topic, period, or genre. May be repeated for credit with consent of instructor.—Slater

**231. Interamerican Studies (4)**

Seminar—3 hours; term paper. Survey of methodologies of investigation for crosscultural or comparative projects in the geographical context of the Americas. Focus on particular problems of language, discipline, national definitions, and global hierarchies of knowledge that complicate such projects. Readings of interamerican cultural texts.—Irwin

**252. Medieval Spanish Literature: Prose (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. An exploration of the major genres of Medieval Spanish prose from its origins to 1450.

**253. Medieval Spanish Literature: Epic (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Medieval Spanish epic narratives. Major theoretical perspectives on the genesis, diffusion, and character of the Medieval epic. Relationship of epic to ballad literature.

**254. Medieval Hispanic Lyric (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Analysis of the most representative lyric poetry in the various Peninsular languages and in Provencal, troubadour poetry, kharijas, villancicos, cantigas de amigo, and courtly lyric.

**255. Spanish Literature of the Early Renaissance (4)**

Seminar—3 hours; term paper. Spanish Literature, 1450-1550, with emphasis on *La Celestina*. (Former course 229.)—Martín

**256. Spanish Literature of the Renaissance and Golden Age: Poetry (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Extensive critical study of the main currents of Renaissance and Baroque Spanish poetry through its language structures, styles ("Culturismo-Conceptismo"), rhetorical devices, myths, and themes (love, death, time).—Martín

**257. Spanish Literature of the Renaissance and Golden Age: Drama (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. An exploration of major 16th and 17th century literary and cultural developments through the study of selected dramas.—Martín

**258. Spanish Literature of the Renaissance and Golden Age: Prose (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. The origins and development of the Spanish novel during the Renaissance and the Spanish Golden Age.—Martín, Slater

**259. Cervantes and the Novel (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. The narrative works of Miguel de Cervantes with special emphasis on *Don Quijote*.—Martín

**260. Modern Spanish Literature (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Topics of Spanish literature, from 1700-1920.

**261. Contemporary Spanish Literature: Poetry (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Critical analysis of modern Spanish poetry from a wide spectrum of poetic currents.

**262. Contemporary Spanish Literature: Narrative (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the 20th-century novel and short story with emphasis on the avant-garde, existentialism, social realism, and postmodern trends. May be repeated two times for credit when topic differs and with consent of instructor.—Martínez-Carazo

**263. Contemporary Spanish Literature: Drama (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. The Spanish theatrical production of the last 70 years.

**264. Contemporary Spanish Literature: Essay (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Major thinkers from Ganivet to Unamuno and Ortega y Gasset. Emphasis will be placed on the relationships between Spanish thought and European philosophical currents.

**265. Women Writers of Spain (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Introduction to the development of a feminine consciousness in the Spanish contemporary literary scene. Selected texts represent particularly innovative typologies of feminine discourse in the realm of the historical, psychoanalytical, and metafictional, erotic, and allegorical fiction.

**272. Critical Approaches to Latin American Literature: Narrative (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Development of Latin American literary periods and currents in narrative (novel, short story, and essay), from early colonial times to the present. May be repeated two times for credit, if material changes.—F. Bejel, Bernucci, Lazzara, Peluffo

**273. Critical Approaches to Latin American Literature: Poetry and Drama (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Development of Latin American literary periods and currents in poetry and drama, from early Colonial times to the present. May be repeated two times for credit when topic differs.—Bejel, Bernucci, Egan

**274. Studies of a Major Writer, Period, or Genre in Latin American Literature (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Artistic development of a major Latin American writer and his/her intellectual and literary milieu or study of a special topic, period, or genre. May be repeated for credit.—Bejel, Bernucci, Irwin, Lazzara, Peluffo

**275. Colonial Literature (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing and consent of instructor. An examination of pre-Hispanic and Colonial narrative, poetry and theatre. Emphasis on historical, anthropological, and ethnographic approaches to Colonial discourse.

**276. Twentieth-Century Latin American Drama (4)**

Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Major Latin American dramatists from Florencio Sánchez to the present. (Former course 240.)

**277. Latin American Novel, 1900-1950 (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of main trends and key authors in Latin America in the first half of the 20th century. (Former course 241A.)—Bernucci

**278. New Trends in Latin American Fiction (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Recent developments in Latin American narrative. Emphasis on innovative language and structure. (Former course 241B.)—Lazzara

**279. Mexican Narrative (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the evolution of Mexican narrative. Emphasis on the narrative of the Revolution and significant contemporary works.

**280. Latin American Short Story (4)**

Seminar—3 hours; term paper. Works by major writers with emphasis on 20th-century authors such as Quiroga, Borges, García Márquez, Cortázar, and Rulfo. (Former course 243.)—Bernucci

**281. Latin American Women Writers (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of feminist critical theories, gender construction, and self-representation within the history of socio-cultural changes in Latin America.—Peluffo

**282. Dario and Modernism (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of poetry and prose of Spanish-American Modernism (1880-1916). (Former course 245.)

**283. New Directions in Latin American Poetry (4)**

Seminar—3 hours; term paper. New trends in Latin American poetry. Offered in alternate years.—(S.) Egan

**284. The Latin American Essay (4)**

Seminar—3 hours; term paper. Major Latin American essayists from Sarmiento to contemporary essayists.

**285. Multicultural Approaches to Cuban Literature and Culture (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of main trends in Cuban literature. Emphasis on historical, geographic, social and cultural context (including music and film). Course taught in English with some readings in Spanish.—Bejel

**291. Foreign Language Learning in the Classroom (4)**

Seminar—3 hours; project. Overview of approaches to university-level foreign language instruction and the theoretical notions underlying current trends in classroom practices across commonly taught foreign languages. (Same course as French 291 and German 291.)—Blake, Bradley, Colombi

**298. Group Study (1-5)**

Prerequisite: graduate standing and consent of instructor. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**299. Research (1-12)**

(S/U grading only.)—F, W, S. (F, W, S.)

**Professional****300. The Teaching of Spanish (3)**

Lecture—3 hours. Prerequisite: senior or graduate standing; a major or minor in Spanish.

**390. The Teaching of Spanish in College (4)**

Lecture—2 hours; discussion—2 hours. Prerequisite: graduate standing. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of graduate teaching assistants.

**396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## Statistics

(College of Letters and Science)

Thomas Lee, Ph.D., Chairperson of the Department

**Department Office.** 4118 Mathematical Sciences Building  
530-752-2361; <http://www.stat.ucdavis.edu>

**Faculty**

Ethan Anderes, Ph.D., Associate Professor

Alexander Aue, Ph.D., Associate Professor

Prabir Burman, Ph.D., Professor

Hao Chen, Ph. D, Assistant Professor

Christiana Drake, Ph.D., Professor

Cho-Jui Hsieh, Ph.D., Assistant Professor

Fushing Hsieh, Ph.D., Professor

Jiming Jiang, Ph.D., Professor

Thomas Lee, Ph.D., Professor

Miles Lopes, Ph.D., Assistant Professor

Xiaodong Li, Ph.D., Assistant Professor

Hans-Georg Müller, M.D., Ph.D., Professor

Debashis Paul, Ph.D., Associate Professor

Jie Peng, Ph.D., Professor

Wolfgang Polonik, Ph.D., Professor

James Sharpnack, Ph.D., Assistant Professor

Duncan Temple Lang, Ph.D., Professor

Jane-Ling Wang, Ph.D., Professor

**Emeriti Faculty**

Rudolph Beran, Ph.D., Professor Emeritus

P.K. Bhattacharya, Ph.D., Professor Emeritus

Yue-Pok (Ed) Mack, Ph.D., Professor Emeritus

George G. Roussas, Ph.D., Professor Emeritus

Francisco J. Samaniego, Ph.D., Professor Emeritus

Robert H. Shumway, Ph.D., Professor Emeritus

Alvin D. Wiggins, Ph.D., Professor Emeritus

**Affiliated Faculty**

Rahman Azari, Ph.D., Lecturer

**The Major Program**

Statistics enables us to make inferences about entire populations, based on samples extracted from those populations. Statistical methods can be applied to problems from almost every discipline and they are vitally important to researchers in agricultural, biological, environmental, social, engineering, and medical sciences.

**The Program.** Statistics majors may receive either a Bachelor of Arts or a Bachelor of Science degree. The B.S. degree program has three options: General

Option, Applied Statistics Option, and Computational Statistics Option. Both the A.B. and the B.S. programs require theoretical and applied course work and underscore the strong interdependence of statistical theory and the applications of statistics.

**B.S. in Statistics-General Option** emphasizes statistical theory and is especially recommended as preparation for graduate study in statistics.

**B.S. in Statistics-Applied Statistics Option** emphasizes statistical applications. This major is recommended for students who do not plan to pursue graduate studies in statistics and those who are interested in combining the statistics study with a second major or minor program in the social and life sciences.

**B.S. in Statistic-Computational Statistics Option**

Option emphasizes computing. This major is recommended for students interested in the computational and data management aspects of statistical analysis.

**A.B. in Statistics-Applied Statistics Option** emphasizes statistical applications. This major is recommended for students who do not plan to pursue graduate studies in statistics and those who are interested in combining the statistics study with a second major or minor program in the social sciences or who wish to pursue a Bachelor of Arts degree.

**Career Alternatives.** Probability models and statistical methods are used in great many fields, including the biological and social sciences, business and engineering. The wide applicability of statistics has created in both the public and private sectors a strong demand for graduates with statistical training. Employment opportunities include careers in data and policy analysis in government, financial management, quality control, insurance and health care industry, actuarial work, engineering, public health, biological and pharmaceutical research, law, and education. Some students have entered advanced studies in statistics, economics, psychology, medicine and other professional school programs.

**A.B. Major Requirements:****Preparatory Subject Matter .....19-23**

Mathematics 16A, 16B, 16C; or 17A, 17B, 17C; or 21A, 21B, 21C.....	9-12
Mathematics 22A.....	3
Computer Science Engineering 30 or Computer Science Engineering 40 (or the equivalent) .....	4
Statistics 32 .....	3-4

**Depth Subject Matter .....45-48**

Statistics 106, 108, 138 or the equivalent .....	12
Statistics 130A, 130B.....	8
Statistics 137 or 141 .....	4
Three courses from: Statistics 104, 135, 137, 141, 142, 144, 145 .....	12
Related elective courses .....	9-12

Three upper division courses approved by major adviser; they should follow a coherent sequence in a single discipline in the social sciences where statistical methods and models are applied and should cover the quantitative aspects of the discipline.

**Total Units for the Major .....64-71****B.S. Major Requirements:****General Statistics Track****Preparatory Subject Matter .....30-32**

Mathematics 21A, 21B, 21C, 21D .....	16
Mathematics 22A or 67 .....	3-4
Mathematics 25 .....	4
Computer Science Engineering 30 or Computer Science Engineering 40 (or the equivalent) .....	4
Any one introductory statistics course except Statistics 10 .....	3-4

**Depth Subject Matter .....51-52**

Statistics 106, 108, 138 .....	12
Statistics 131A, 131B, 131C .....	12
Three courses from: Statistics 104, 135, 137, 141, 142, 144, 145 .....	12
Mathematics 125A, 108 or 125B, and 167 .....	12
Related elective courses .....	3-4

One upper division course approved by major adviser; it should be in mathematics, computer science or in quantitative aspects of a substantive discipline.

**Total Units for the Major .....81-84****Applied Statistics Track****Preparatory Subject Matter .....26-31**

Mathematics 16A, 16B, 16C; or 17A, 17B, 17C; or 21A, 21B, 21C (21 series recommended).....	9-12
Mathematics 22A .....	3
Computer Science Engineering 30 or Computer Science Engineering 40 (or the equivalent) .....	4
Two introductory courses serving as the prerequisites to upper division courses in a chosen discipline to which statistics is applied.....	7-8
Any one introductory statistics course except Statistics 10.....	3-4

**Depth Subject Matter .....51-56**

Statistics 106, 108, 138, 141 .....	16
Statistics 130A, 130B.....	8
Three courses selected from Statistics 104, 135, 137, 142, 144, 145 .....	12
Five upper division elective courses outside of Statistics.....	15-20
Electives are chosen with and must be approved by the major adviser. Electives should follow a coherent sequence in one single discipline where statistical methods and models are applied: at least three of them should cover the quantitative aspects of the discipline.	

**Total Units for the Major .....77-87****Computational Statistics Track****Preparatory Subject Matter .....30-31**

Mathematics 21A, 21B, 21C, 21D .....	16
Mathematics 22A .....	3
Computer Science Engineering 30 and 40 .....	8
Any one introductory statistics course except Statistics 10.....	3-4

**Depth Subject Matter .....52**

Statistics 106, 108, 141 .....	12
Statistics 131A, 131B .....	8
Two courses from: Statistics 104, 135, 137, 138, 142, 144, 145 .....	8
Programming, Data Management & Data Technologies: Computer Science Engineering 130 or 145; and 165A or 166 .....	8
Two courses on Scientific Computational Algorithm and Visualization from: Computer Science Engineering 122A, 129, 140A, 158, 163 .....	8
Two courses from: Mathematics 124, 128A, 128B, 129, 145, 148, 160, 165, 167, 168 .....	8

**Total Units for the Major .....82-83****Major Adviser.** A. Aue

Students are encouraged to meet with an adviser to plan a program as early as possible. Sometime before or during the first quarter of the junior year, students planning to major in Statistics should consult with a faculty adviser to plan the remainder of their undergraduate programs.

**Minor Program Requirements:**

The Department offers a minor program in Statistics that consists of five upper division level courses focusing on the fundamentals of mathematical statis-

tics and of the most widely used applied statistical methods.

## UNITS

**Statistics.....20**

Statistics 106, 108, and 130A-130B or 131A-131B .....16

One course from: Statistics 104, 135, 137, 138, 141, 142, 144, 145 .....4

**Preparation.** Statistics 13 or 32 or 100 or 102.

**Graduate Study.** The Graduate Program in Statistics offers study and research leading to the M.S. and Ph.D. degrees in Statistics, including a Ph.D. in Statistics with a Biostatistics Track. Detailed information concerning these degree programs, as well as information on admissions and on financial support, is available from the Department of Statistics.

**Graduate Adviser.** Debasish Paul

**Statistical Consulting.** The Department provides a consulting service for researchers on campus. For more information, call the Statistical Laboratory office 530-752-6096.

**Integrated B.S./M.S. Degree****Program**

The Department offers undergraduate majors a path into the Statistics M.S. program through the Integrated Degree Program (I.D.P.). This program is intended for students who seek to be employed as statisticians in government or industry. The minimum major GPA requirement is 3.200 at the end of the junior year, although students with demonstrated excellence in academic work (with a major GPA of 3.500 or above) are most likely to be admitted. Before moving into the graduate phase, I.D.P. students must satisfy all requirements of the B.S. degree.

To apply for the I.D.P., undergraduate students must submit the Statistics I.D.P. form along with supporting documents during the last quarter of their junior year, to enter the I.D.P. in the first quarter of their senior year. In addition, applicants must submit an application to the M.S. program during the senior year, prior to the deadline of the MS application. Students with a major GPA of 3.500 or above may waive the GRE requirement in the M.S. application. Before applying to the I.D.P., students are strongly advised to consult with both the undergraduate and graduate advisers.

Once a student enters the graduate phase of the I.D.P., they follow the course requirements for the Master's degree (36 units, 18 of which are graduate level). A maximum of 6 units taken in the undergraduate phase can be transferred to the M.S. provided they have not been used to satisfy any requirements of the B.S. degree.

**Courses in Statistics (STA)****Lower Division****10. Statistical Thinking (4)**

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: two years of high school algebra. Statistics and probability in daily life. Examines principles of collecting, presenting and interpreting data in order to critically assess results reported in the media; emphasis is on understanding polls, unemployment rates, health studies; understanding probability, risk and odds. GE credit: SciEng or SocSci, Wrt | QL, SE.—F. (F.)

**12. Introduction to Discrete Probability (4)**

Lecture—3 hours; laboratory—1 hour. Prerequisite: two years of high school algebra. Random experiments; countable sample spaces; elementary probability axioms; counting formulas; conditional probability; independence; Bayes theorem; expectation; gambling problems; binomial, hypergeometric, Poisson, geometric, negative binomial and multinomial models; limiting distributions; Markov chains. Applications in the social, biological, and engineering sciences. Offered in alternate years. GE credit: SciEng | QL, SE.

**13. Elementary Statistics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: two years of high school algebra or Mathematics D. Descriptive statistics; basic probability concepts; binomial, normal, Student's t, and chi-square distributions. Hypothesis testing and confidence intervals for one and two means and proportions. Regression. Not open for credit to students who have completed course 13V or higher. GE credit: SciEng | QL, SE.—F, W, S, Su. (F, W, S, Su.)

**13Y. Elementary Statistics (4)**

Lecture—1.5 hours; web virtual lecture—5 hours. Prerequisite: two years of high school algebra or Mathematics D. Descriptive statistics; basic probability concepts; binomial, normal, Student's t, and chi-square distributions. Hypothesis testing and confidence intervals for one and two means and proportions. Regression. Not open for credit for students who have completed course 13, or higher. GE credit: SciEng | QL, SE.

**32. Introductory Statistical Analysis Through Computers (4)**

Lecture—3 hours; laboratory—1 hour. Prerequisite: Mathematics 16B or 17C or 21B; ability to program in a high-level programming language. Probability concepts: Events and sample spaces; random variables; mass, density and distribution functions; parametric families; parameter estimation and confidence intervals; hypothesis testing; Central Limit Theorem. Recommended as alternative to course 13 for students with a background in calculus and programming. Only two units of credit allowed to students who have taken course 13, or 102; not open for credit to students who have taken course 100. GE credit: SciEng | QL, SE.—W, S. (W, S.)

**90X. Seminar (1-2)**

Seminar—1-2 hours. Prerequisite: high school algebra and consent of instructor. Examination of a special topic in a small group setting.

**98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division****100. Applied Statistics for Biological Sciences (4)**

Lecture—3 hours; laboratory—1 hour. Prerequisite: Mathematics 16B or 17C or 21B. Descriptive statistics, probability, sampling distributions, estimation, hypothesis testing, contingency tables, ANOVA, regression; implementation of statistical methods using computer package. Only two units credit allowed to students who have taken courses 13, 32 or 103; not open for credit to students who have taken course 102. GE credit: SciEng | QL, SE.—F, W, S, Su. (F, W, S, Su.)

**101. Advanced Applied Statistics for the Biological Sciences (4)**

Lecture—3 hours; laboratory—1 hour. Prerequisite: course 100. Basic experimental designs, two-factor ANOVA without interactions, repeated measures ANOVA, ANCOVA, random effects vs. fixed effects, multiple regression, basic model building, resampling methods, multiple comparisons, multivariate methods, generalized linear models, Monte Carlo simulations. GE credit: SciEng | SE, QL.—S. (S.)

**103. Applied Statistics for Business and Economics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 13, 32, or 100; and Mathematics 16B or 17C or 21B. Descriptive statistics; probability; random variables; expectation; binomial, normal, Poisson, other univariate distributions; joint distributions; sampling distributions, central limit theorem; properties of estimators; linear combinations of random variables; testing and estimation; Minitab computing package. Two units credit given to students who have completed course 100. GE credit: SciEng | QL, SE.—F, W, S, Su. (F, W, S, Su.)

**104. Applied Statistical Methods:****Nonparametric Statistics (4)**

Lecture—3 hours; laboratory—1 hour. Prerequisite: course 13, 32, or 100. Sign and Wilcoxon tests, Walsh averages. Two-sample procedures. Inferences concerning scale. Kruskal-Wallis test. Measures of association. Chi square and Kolmogorov-Smirnov tests. Offered in alternate years. GE credit: SciEng | QL, SE.—S. (S.)

**106. Applied Statistical Methods: Analysis of Variance (4)**

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 13 or 32 or 100. Basics of experimental design. One-way and two-way fixed effects analysis of variance models. Randomized complete and incomplete block design. Multiple comparisons procedures. One-way random effects model. GE credit: SciEng | SE.—F, W, S, Su. (F, W, S, Su.)

**108. Applied Statistical Methods: Regression Analysis (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 13, 32, or 100. Simple linear regression, variable selection techniques, stepwise regression, analysis of covariance, influence measures, computing packages. GE credit: SciEng | QL, SE, SL.—F, W, S, Su. (F, W, S, Su.)

**130A. Mathematical Statistics: Brief Course (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16B or 17C or 21B. Basic probability, densities and distributions, mean, variance, covariance, Chebychev's inequality, some special distributions, sampling distributions, central limit theorem and law of large numbers, point estimation, some methods of estimation, interval estimation, confidence intervals for certain quantities, computing sample sizes. Only 2 units of credit allowed to students who have taken course 131A. GE credit: SciEng | QL, SE.—F. (F.)

**130B. Mathematical Statistics: Brief Course (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 130A or 131A or Mathematics 135A. Transformed random variables, large sample properties of estimates. Basic ideas of hypotheses testing, likelihood ratio tests, goodness-of-fit tests. General linear model, least squares estimates, Gauss-Markov theorem. Analysis of variance, F-test. Regression and correlation, multiple regression. Selected topics. GE credit: SciEng | QL, SE.—W. (W.)

**131A. Introduction to Probability Theory (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21B, 21C and 22A. Fundamental concepts of probability theory, discrete and continuous random variables, standard distributions, moments and moment-generating functions, laws of large numbers and the central limit theorem. Not open for credit to students who have completed Mathematics 135A. GE credit: SciEng | QL, SE.—F, S. (F, S.)

**131B. Introduction to Mathematical Statistics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 131A or consent of the instructor. Sampling, methods of estimation, sampling distributions, confidence intervals, testing hypotheses, linear regression, analysis of variance, elements of large sample theory and nonparametric inference. GE credit: SciEng | QL, SE.—W. (W.)

**131C. Introduction to Mathematical Statistics (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 131B or consent of the instructor. Sampling, methods of estimation, sampling distributions, confidence intervals, testing hypotheses, linear regression, analysis of variance, elements of large sample theory and nonparametric inference. GE credit: SciEng | SE, QL.—S. (S.)

**135. Multivariate Data Analysis (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 130B or 131B; and Mathematics 22A or 67. Multivariate normal distribution; Mahalanobis distance; sampling distributions of the mean vector and

covariance matrix; Hotelling's T<sup>2</sup>; simultaneous inference; one-way MANOVA; discriminant analysis; principal components; canonical correlation; factor analysis. Intensive use of computer analyses and real data sets. GE credit: SciEng | QL, SE. —W, S. (W, S.)

### **137. Applied Time Series Analysis (4)**

Lecture—3 hours; laboratory—1 hour. Prerequisite: course 108. Time series relationships; univariate time series models: trend, seasonality, correlated errors; regression with correlated errors; autoregressive models; autoregressive moving average models; spectral analysis: cyclical behavior and periodicity, measures of periodicity, periodogram; linear filtering; prediction of time series; transfer function models. GE credit: SciEng | QL, SE. —F, W. (F, W.)

### **138. Analysis of Categorical Data (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 130B or 131B, or courses 106 and 108. Varieties of categorical data, cross-classifications, contingency tables, tests for independence. Multidimensional tables and log-linear models, maximum likelihood estimation; tests of goodness-of-fit. Logit models, linear logistic models. Analysis of incomplete tables. Packaged computer programs, analysis of real data. GE credit: SciEng | QL, SE. —F, W. (F, W.)

### **141. Statistical Computing (4)**

Lecture—3 hours; laboratory—1 hour. Prerequisite: one introductory class in Statistics (such as 13, 32, 100, or 102), or the equivalent. Organization of computations to access, transform, explore, analyze data and produce results. Concepts and vocabulary of statistical/scientific computing. GE credit: SciEng | QL, SE. —F. (F.)

### **141A. Fundamentals of Statistical Data Science (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or course 13 or course 32 or course 100. Introduction to computing for data analysis and visualization, and simulation, using a high-level language (e.g., R). Computational reasoning, computationally intensive statistical methods, reading tabular and non-standard data. open for credit to students who have taken course 141 or course 242. —F. (F.)

### **141B. Data & Web Technologies for Data Analysis (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 141A or Engineering: Computer Science 145. Essentials of using relational databases and SQL. Processing data in blocks. Scraping Web pages and using Web services/APIs. Basics of text mining. Interactive data visualization with Web technologies. Computational data workflow and best practices. Statistical methods. —W. (W.)

### **141C. Big Data & High Performance Statistical Computing (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 141A or Engineering: Computer Science 40. High-performance computing in high-level data analysis languages; different computational approaches and paradigms for efficient analysis of big data; interfaces to compiled languages; R and Python programming languages; high-level parallel computing; MapReduce; parallel algorithms and reasoning. —S. (S.)

### **144. Sampling Theory of Surveys (4)**

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 130B or 131B; or courses 106 and 108. Simple random, stratified random, cluster, and systematic sampling plans; mean, proportion, total, ratio, and regression estimators for these plans; sample survey design, absolute and relative error, sample size selection, strata construction; sampling and nonsampling sources of error. Offered in alternate years. GE credit: SciEng | QL, SE. —S.

### **145. Bayesian Statistical Inference (4)**

Lecture—3 hours; laboratory—1 hour. Prerequisite: courses 130B or 131B. Subjective probability, Bayes Theorem, conjugate priors, non-informative priors, estimation, testing, prediction, empirical Bayes methods, properties of Bayesian procedures, comparisons with classical procedures, approxima-

tion techniques, Gibbs sampling, hierarchical Bayesian analysis, applications, computer implemented data analysis. Offered in alternate years. GE credit: SciEng | QL, SE. —W. S. (W, S.)

### **160. Practice in Statistical Data Science (4)**

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 106; course 108; course 130B or course 131B; course 141 or course 141A. Principles and practice of interdisciplinary, collaborative data analysis; complete case study review and team data analysis project. GE credit: SciEng | QL, SE. —S. (S.)

### **190X. Seminar (1-2)**

Seminar—1-2 hours. Prerequisite: course 13, 32, 100, or 103. In-depth examination of a special topic in a small group setting. —F, W, S. (F, W, S.)

### **192. Internship in Statistics (1-12)**

Internship—3-36 hours; term paper. Prerequisite: upper division standing and consent of instructor. Work experience in statistics. (P/NP grading only.)

### **194HA-194HB. Special Studies for Honors Students (4-4)**

Independent study—12 hours. Prerequisite: senior qualifying for honors. Directed reading, research and writing, culminating in the completion of a senior honors thesis or project under direction of a faculty adviser. (Deferred grading only, pending completion of sequence.) GE credit: SciEng | SE.

### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

### **Graduate**

#### **200A. Introduction to Probability Theory (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21A, 21B, 21C, and 22A; consent of instructor. Fundamental concepts of probability theory, discrete and continuous random variables, standard distributions, moments and moment-generating functions, laws of large numbers and the central limit theorem. No credit to students who have taken course 131A. GE credit: SciEng | QL, SE. —F, W, S. (F, W, S.)

#### **200B. Introduction to Mathematical Statistics I (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A or the consent of the instructor. Sampling, methods of estimation, bias-variance decomposition, sampling distributions, Fisher information, confidence intervals, and some elements of hypothesis testing. No credit to students who have taken course 131B. GE credit: SciEng | SE. —W, S. (W, S.)

#### **200C. Introduction to Mathematical Statistics II (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200B or consent of the instructor. Testing theory, tools and applications from probability theory, Linear model theory, ANOVA, goodness-of-fit. GE credit: No credit to students who have taken course 131C. SciEng | SE. —S. (S.)

#### **201. SAS Programming for Statistical Analysis (3)**

Lecture—2 hours; discussion/laboratory—1 hour. Prerequisite: introductory, upper-division Statistics course; some knowledge of vectors and matrices; courses 106 or 108 or the equivalent suggested. Introductory SAS language, data management, statistical applications, methods. Includes basics, graphics, summary statistics, data sets, variables and functions, linear models, repetitive code, simple macros, GLIM and GAM, formatting output, correspondence analysis, bootstrap. Prepare SAS base programmer certification exam. —S. (S.)

#### **205. Statistical Methods for Research with SAS (4)**

Lecture—3 hours; laboratory—1 hour. Prerequisite: introductory upper division statistics course and some knowledge of vectors and matrices; courses

course 100, or 102, or 103 suggested or the equivalent. Focus on linear statistical models widely used in scientific research. Emphasis on concepts, methods and data analysis using SAS. Topics include simple and multiple linear regression, polynomial regression, diagnostics, model selection, variable transformation, factorial designs and ANCOVA. —S. (S.)

### **206. Statistical Methods for Research—I (4)**

Lecture—3 hours; laboratory/discussion—1 hour. Prerequisite: introductory statistics course; some knowledge of vectors and matrices. Focus on linear statistical models. Emphasis on concepts, method and data analysis; formal mathematics kept to minimum. Topics include simple and multiple linear regression, polynomial regression, diagnostics, model selection, factorial designs and analysis of covariance. Use of professional level software. —F. (F.)

### **207. Statistical Methods for Research—II (4)**

Lecture—3 hours; laboratory/discussion—1 hour. Prerequisite: course 206; knowledge of vectors and matrices. Linear and nonlinear statistical models emphasis on concepts, methods/data analysis using professional level software; formal mathematics kept to minimum. Topics include linear mixed models, repeated measures, generalized linear models, model selection, analysis of missing data, and multiple testing procedures. —F. (F.)

### **208. Statistical Methods in Machine Learning (4)**

Lecture—3 hours; laboratory/discussion—1 hour. Prerequisite: course 206, 207 and 135, or their equivalents. Focus on linear and nonlinear statistical models. Emphasis on concepts, methods, and data analysis; formal mathematics kept to minimum. Topics include resampling methods, regularization techniques in regression and modern classification, cluster analysis and dimension reduction techniques. Use professional level software. —S. (S.)

### **222. Biostatistics: Survival Analysis (4)**

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 131C. Incomplete data; life tables; nonparametric methods; parametric methods; accelerated failure time models; proportional hazards models; partial likelihood; advanced topics. (Same course as Biostatistics 222.) —F. (F.)

### **223. Biostatistics: Generalized Linear Models (4)**

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 131C. Likelihood and linear regression; generalized linear model; Binomial regression; case-control studies; dose-response and bioassay; Poisson regression; Gamma regression; quasi-likelihood models; estimating equations; multivariate GLMs. (Same course as Biostatistics 223.) —W. (W.)

### **224. Analysis of Longitudinal Data (4)**

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course/Biostatistics 222, 223 and course 232B or consent of instructor. Standard and advanced methodology, theory, algorithms, and applications relevant for analysis of repeated measurements and longitudinal data in biostatistical and statistical settings. (Same course as Biostatistics 224.) —S. (S.)

### **225. Clinical Trials (4)**

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course/Biostatistics 223 or consent of instructor. Basic statistical principles of clinical designs, including bias, randomization, blocking, and masking. Practical applications of widely-used designs, including dose-finding, comparative and cluster randomization designs. Advanced statistical procedures for analysis of data collected in clinical trials. (Same course as Biostatistics 225.) Offered in alternate years. —S.

### **226. Statistical Methods for Bioinformatics (4)**

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 131C or consent of instructor; data analysis experience recommended. Standard and advanced statistical methodology, theory, algo-

rithms, and applications relevant to the analysis of omics data. (Same course as Biostatistics 226.) Offered in alternate years.—(W.)

### **231A. Mathematical Statistics I (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 131A-C, Mathematics 25 and Mathematics 125A or equivalent. First part of three-quarter sequence on mathematical statistics. Emphasizes foundations. Topics include basic concepts in asymptotic theory, decision theory, and an overview of methods of point estimation.—F. (F.)

### **231B. Mathematical Statistics II (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 231A. Second part of a three-quarter sequence on mathematical statistics. Emphasizes hypothesis testing (including multiple testing) as well as theory for linear models.—W. (W.)

### **231C. Mathematical Statistics III (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 231A, 231B. Third part of three-quarter sequence on mathematical statistics. Emphasizes large sample theory and their applications. Topics include statistical functionals, smoothing methods and optimization techniques relevant for statistics.—S. (S.)

### **232A. Applied Statistics I (4)**

Lecture—3 hours; laboratory—1 hour. Prerequisite: courses 106, 108, 131A, 131B, 131C, and Mathematics 167. Estimation and testing for the general linear model, regression, analysis of designed experiments, and missing data techniques.—F. (F.)

### **232B. Applied Statistics II (4)**

Lecture—3 hours; laboratory—1 hour. Prerequisite: courses 106, 108, 131A, 131B, 131C, 232A and Mathematics 167. Alternative approaches to regression, model selection, nonparametric methods amenable to linear model framework and their applications.—W. (W.)

### **232C. Applied Statistics III (4)**

Lecture—3 hours; laboratory—1 hour. Prerequisite: courses 106, 108, 131C, 232B and Mathematics 167. Multivariate analysis: multivariate distributions, multivariate linear models, data analytic methods including principal component, factor, discriminant, canonical correlation and cluster analysis.—W. (W.)

### **233. Design of Experiments (3)**

Lecture—3 hours. Prerequisite: course 131C. Topics from balanced and partially balanced incomplete block designs, fractional factorials, and response surfaces. Offered in alternate years.—(S.)

### **235A. Probability Theory (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: Mathematics 125B and 135A or course 131A or consent of instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from martingales, Markov chains, ergodic theory. (Same course as Mathematics 235A.)—F. (F.)

### **235B. Probability Theory (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: Mathematics 235A/course 235A or consent of instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from martingales, Markov chains, ergodic theory. (Same course as Mathematics 235B.)—W. (W.)

### **235C. Probability Theory (4)**

Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: 235A—course/Mathematics 235B or consent of instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional

expectation. Topics selected from martingales, Markov chains, ergodic theory. (Same course as Mathematics 235C.)—S. (S.)

### **237A. Time Series Analysis (4)**

Lecture—3 hours; term paper. Prerequisite: course 131B or the equivalent. Advanced topics in time series analysis and applications. Models for experimental data, measures of dependence, large-sample theory, statistical estimation and inference. Univariate and multivariate spectral analysis, regression, ARIMA models, state-space models, Kalman filtering. Offered in alternate years.—(F.)

### **237B. Time Series Analysis (4)**

Lecture—3 hours; term paper. Prerequisite: course 131B or the equivalent. Advanced topics in time series analysis and applications. Models for experimental data, measures of dependence, large-sample theory, statistical estimation and inference. Univariate and multivariate spectral analysis, regression, ARIMA models, state-space models, Kalman filtering. Offered in alternate years.—(W.)

### **238. Theory of Multivariate Analysis (4)**

Lecture—3 hours; term paper. Prerequisite: courses 131B and 135. Multivariate normal and Wishart distributions, Hotelling's T-Squared, simultaneous inference, likelihood ratio and union intersection tests, Bayesian methods, discriminant analysis, principal component and factor analysis, multivariate clustering, multivariate regression and analysis of variance, application to data. Offered in alternate years.—W.

### **240A. Nonparametric Inference (4)**

Lecture—3 hours; term paper. Prerequisite: course 231C; courses 235A-235B-235C recommended. Comprehensive treatment of nonparametric statistical inference, including the most basic materials from classical nonparametrics, robustness, nonparametric estimation of a distribution function from incomplete data, curve estimation, and theory of resampling methodology. Offered in alternate years.—(W.)

### **240B. Nonparametric Inference (4)**

Lecture—3 hours; term paper. Prerequisite: course 231C; courses 235A-235B-235C recommended. Comprehensive treatment of nonparametric statistical inference, including the most basic materials from classical nonparametrics, robustness, nonparametric estimation of a distribution function from incomplete data, curve estimation, and theory of resampling methodology. Offered in alternate years.—(S.)

### **241. Asymptotic Theory of Statistics (4)**

Lecture—3 hours; term paper. Prerequisite: course 231C; courses 235A-235B-235C desirable. Topics in asymptotic theory of statistics chosen from weak convergence, contiguity, empirical processes, Edgeworth expansion, and semiparametric inference. Offered in alternate years.—(S.)

### **242. Introduction to Statistical Programming (4)**

Lecture—3 hours; laboratory—1 hour. Prerequisite: courses 130A and 130B or equivalent. Essentials of statistical computing using a general-purpose statistical language. Topics include algorithms; design; debugging and efficiency; object-oriented concepts; model specification and fitting; statistical visualization; data and text processing; databases; computer systems and platforms; comparison of scientific programming languages. Offered in alternate years.—W.

### **243. Computational Statistics (4)**

Lecture—3 hours; laboratory—1 hour. Prerequisite: courses 130A and 130B or equivalent, and Mathematics 167 or Mathematics 67 or equivalent. Numerical analysis; random number generation; computer experiments and resampling techniques (bootstrap, cross validation); numerical optimization; matrix decompositions and linear algebra computations; algorithms (markov chain monte carlo, expectation-maximization); algorithm design and efficiency; parallel and distributed computing. Offered in alternate years.—W.

### **250. Topics in Applied and Computational Statistics (4)**

Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: course 131A; course 232A recommended, not required. Resampling, nonparametric and semiparametric methods, incomplete data analysis, diagnostics, multivariate and time series analysis, applied Bayesian methods, sequential analysis and quality control, categorical data analysis, spatial and image analysis, computational biology, functional data analysis, models for correlated data, learning theory. May be repeated for credit with consent of graduate adviser. Offered irregularly.—F, W, S.

### **251. Topics in Statistical Methods and Models (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 231B or equivalent. Topics may include Bayesian analysis, nonparametric and semiparametric regression, sequential analysis, bootstrap, statistical methods in high dimensions, reliability, spatial processes, inference for stochastic process, stochastic methods in finance, empirical processes, change-point problems, asymptotics for parametric, nonparametric and semiparametric models, nonlinear time series, robustness. May be repeated if topics differ; only with consent of the graduate adviser. Offered irregularly.—F, W, S. (F, W, S.)

### **252. Advanced Topics in Biostatistics (4)**

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course/Biostatistics 222 and course/ Biostatistics 223. Biostatistical methods and models selected from the following: genetics, bioinformatics and genomics; longitudinal or functional data; clinical trials and experimental design; analysis of environmental data; dose-response, nutrition and toxicology; survival analysis; observational studies and epidemiology; computer-intensive or Bayesian methods in biostatistics. May be repeated for credit with consent of adviser when topic differs. (Same course as Biostatistics 252.) Offered in alternate years.—S.

### **260. Statistical Practice and Data Analysis (3)**

Lecture/discussion—3 hours. Prerequisite: working knowledge of advanced statistical software and completion of at least one of course 207 or 232B or the equivalent. Open to students enrolled in the graduate program in Statistics or Biostatistics, as the class also serves to provide professional service to clients and collaborators who work with the students. Principles and practice of interdisciplinary collaboration in statistics, statistical consulting, ethical aspects, and basics of data analysis and study design. Emphasis on practical consulting and collaboration of statisticians with clients and scientists under instructor supervision. May be repeated one time for credit.—F, W, S. (F, W, S.)

### **280. Orientation to Statistical Research (2)**

Seminar—2 hours. Prerequisite: consent of instructor. Guided orientation to original statistical research papers, and oral presentations in class of such papers by students under the supervision of a faculty member. May be repeated one time for credit. (S/U grading only.)—S. (S.)

### **290. Seminar in Statistics (1-6)**

Prerequisite: consent of instructor. Seminar on advanced topics in probability and statistics. (S/U grading only.)—F, W, S. (F, W, S.)

### **292. Graduate Group in Statistics Seminar (1-2)**

Seminar—1-2 hours. Prerequisite: graduate standing. Advanced study in various fields of statistics with emphasis in applied topics, presented by members of the Graduate Group in Statistics and other guest speakers. (S/U grading only.)—S. (S.)

### **298. Directed Group Study (1-5)**

Prerequisite: graduate standing, consent of instructor.

### **299. Individual Study (1-12)**

Prerequisite: consent of instructor. (S/U grading only.)

**299D. Dissertation Research (1-12)**

Prerequisite: advancement to candidacy for Ph.D., consent of instructor. (S/U grading only.)

**Professional****390. Methods of Teaching Statistics (2)**

Lecture/discussion—1 hour; laboratory—1 hour. Prerequisite: graduate standing. Practical experience in methods/problems of teaching statistics at university undergraduate level. Lecturing techniques, analysis of tests and supporting material, preparation and grading of examinations, and use of statistical software. Emphasis on practical training. May be repeated for credit. (S/U grading only.)—F. (F.)

**396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: consent of instructor; graduate standing. (S/U grading only.)—F, W, S. (F, W, S.)

**Professional****401. Methods in Statistical Consulting (3)**

Lecture—3 hours; discussion—1 hour. Students must be enrolled in the graduate program in Statistics or Biostatistics. Introduction to consulting, in-class consulting as a group, statistical consulting with clients, and in-class discussion of consulting problems. Clients are drawn from a pool of University clients. May be repeated for credit with consent of graduate adviser. Offered irregularly. (S/U grading only.)—F, W, S. (F, W, S.)

## Statistics (A Graduate Program)

Thomas (C.M.) Lee, Ph.D., Chairperson of the Program

Jie Peng, Ph.D., Vice Chairperson for Graduate Affairs

**Program Office.** 4118 Mathematical Sciences Building 530-692-5194;  
<http://www.stat.ucdavis.edu>

**Faculty**

Ethan Anderes, Ph.D., Associate Professor (*Statistics*)  
Alexander Aue, Ph.D., Associate Professor (*Statistics*)

Laurel Beckett, Ph.D., Professor (*Public Health Sciences*)

Paul Baines, Ph.D., Assistant Professor (*Statistics*)

Prabir Burman, Ph.D., Professor (*Statistics*)

Colin Cameron, Ph.D., Professor (*Economics*)

Hao Chen, Ph.D., Assistant Professor (*Statistics*)

Christiana Drake, Ph.D., Professor (*Statistics*)

Cho-Jui Hsieh, Ph.D., Assistant Professor (*Statistics*)

Fushing Hsieh, Ph.D., Professor (*Statistics*)

Jiming Jiang, Ph.D., Professor (*Statistics*)

Oscar Jorda, Ph.D., Professor (*Economics*)

Thomas Lee, Ph.D., Professor (*Statistics*)

Xiaodong Li, Ph.D., Assistant Professor (*Statistics*)

Miles Lopes, Ph.D., Assistant Professor (*Statistics*)

Hans-Georg Müller, M.D., Ph.D., Professor (*Statistics*)

Debashis Paul, Ph.D., Associate Professor (*Statistics*)

Jie Peng, Ph.D., Professor (*Statistics*)

Wolfgang Polonik, Ph.D., Professor (*Statistics*)

David Rocke, Ph.D., Professor (*Public Health Sciences*)

Naoki Saito, Ph.D., Professor (*Mathematics*)

James Sharpnack, Ph.D., Assistant Professor (*Statistics*)

Duncan Temple Lang, Ph.D., Professor (*Statistics*)

Chih-Ling Tsai, Ph.D., Professor (*Graduate School of Management*)

Jane-Ling Wang, Ph.D., Professor (*Statistics*)

**Emeriti Faculty**

Rudolph Beran, Ph.D., Professor Emeritus

P.K. Bhattacharya, Ph.D., Professor Emeritus

Thomas B. Farver, Ph.D., Professor (*Population Health and Reproduction*)

George G. Roussas, Ph.D., Professor Emeritus

Yue-Pok [Ed] Mack, Ph.D., Professor Emeritus

Francisco J. Samaniego, Ph.D., Professor Emeritus

Robert H. Shumway, Ph.D., Professor Emeritus

Alvin D. Wiggins, Ph.D., Professor Emeritus

**Affiliated Faculty**

Rahman Azari, Ph.D., Lecturer (*Statistics*)

**Graduate Study.** The Graduate Program in Statistics offers programs of study and research leading to the M.S. and Ph.D. degrees. The M.S. gives students a strong foundation in the theory of statistics as well as substantial familiarity with the most widely used statistical methods. Facility in computer programming is essential for some of the course work. The supervised statistical consulting required of all M.S. students has proven to be a valuable educational experience. The Ph.D. program combines advanced course work in statistics and probability with the opportunity for in-depth concurrent study in an applied field. For detailed information contact the Chairperson of the Program or the Graduate Adviser.

**Preparation.** Preparation for the graduate program requires a year of calculus, a course in linear algebra, facility with a programming language and upper division coursework in mathematics and/or statistics. For admission to the Ph.D. program, course work requirements for the master's degree, and at least one semester/two quarters of advanced calculus must be completed.

**Graduate Adviser.** Debasish Paul (*Statistics*)

## Study of Religion (A Graduate Group)

Flagg Miller, Ph.D., Chairperson of the Group

**Program Office.** 216 Sproul Hall  
530-752-5799; Fax 530-752-8630  
<http://religiongradgroup.ucdavis.edu/>

**Faculty**

Emily Albu, Ph.D., Professor (*Classics*)

David Biale, Ph.D., Professor (*History*)

Catherine Chin, Ph.D., Professor (*Religious Studies*)

Allison Couder, Ph.D., Professor (*Religious Studies*)

Mark K. Elmore, Ph.D., Professor (*Religious Studies*)

Elizabeth Freeman, Ph.D., Professor (*English*)

Cody Gilmore, Ph.D., Professor (*Philosophy*)

John R. Hall, Ph.D., Professor Emeritus (*Sociology*)

Mark Halperin, Ph.D., Professor (*East Asian Languages*)

A. Katie Harris, Ph.D., Professor (*History*)

Million F. Harrison, Ph.D., Lecturer (*African American & African Studies*)

Inés Hernández-Avila, Ph.D., Professor (*Native American Studies*)

Naomi Janowitz, Ph.D., Professor (*Religious Studies*)

Suad Joseph, Ph.D., Professor (*Anthropology and Women & Gender Studies*)

Flagg Miller, Ph.D., Professor (*Religious Studies*)

Eva Mroczek, Ph.D., Professor (*Religious Studies*)

Jessie Ann Owens, Ph.D., Professor (*Music*)

Meaghan O'Keefe, Ph.D., Professor (*Religious Studies*)

Lynn Roller, Ph.D., Professor (*Art History*)

Seth Sanders, Ph.D., Professor (*Religious Studies*)

Jocelyn Sharlet, Ph.D., Professor (*Comparative Literature*)

John Smolenski, Ph.D., Professor (*History*)

Henry Spiller, Ph.D., Professor (*Music*)

Smriti Srinivas, Ph.D., Professor (*Anthropology*)

Daniel Stolzenberg, Ph.D., Professor (*History*)

Mairaj Syed, Ph.D., Professor (*Religious Studies*)

Jan Szaić, Ph.D., Professor (*Philosophy*)

Baki Tezcan, Ph.D., Professor (*History & Religious Studies*)

Archana Venkatesan, Ph.D., Professor (*Comparative Literature & Religious Studies*)

Heghnar Watenpaugh, Ph.D., Professor (*Art History*)

Keith Watenpaugh, Ph.D., Professor (*Religious Studies*)

Diane Wolf, Ph.D., Professor (*Sociology*)

Michael Ziser, Ph.D., Professor (*English*)

**Graduate Study (A Graduate Program)**

The Graduate Group in the Study of Religion offers students classical training in the literatures of particular religious traditions, and they are encouraged to understand these traditions at the intersection of contemporary thematic and regional phenomena.

Students have the opportunity to concentrate primarily on one of three regional specializations: American religious cultures, Mediterranean religions, and Asian religions. An additional regional specialization typically serves as a secondary area of competence. Students further shape their scholarship through intensive engagement in one of the following thematic specializations: Values, Ethics, and Human Rights; Modernity, Science, and Secularism; Visual Culture, Media, and Technology; Language, Rhetoric, and Performance; Body and Praxis; Theory and Method.

This curriculum guides students through a rigorous course of study, providing the breadth and depth necessary to produce exciting, rigorous scholarship at forefront of the field of Religious Studies. Graduate Group training prepares students for careers in academia as well as in the government and the private sector.

**Preparation.** Admission to the Graduate Group requires a Bachelor's or Master's degree in a discipline relevant to the study of religion, as well as preparation in at least one language relevant to the intended area of primary research. The group requires three letters of recommendation and a sample of recent written work. The general GRE is also required.

**Graduate Adviser.** Contact the Group office.

### Courses in Study of Religion (REL) Graduate

#### 200A. Historical Roots of the Study of Religion (4)

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Consideration of the historical and philosophical formation of religion as a concept. Treats the emergence of religion as a category of analysis and understanding from the Reformation through the Enlightenment.—F. (F.) Couder, Janowitz, Stolzenberg

#### 200B. Foundational Theories of Religion (4)

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Survey of classical 19th and 20th century approaches to the study of religion.—W. (W.) Couder, Janowitz, Syed

#### 200C. Contemporary Approaches to the Study of Religion (4)

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Consideration of major themes, issues and methods in the contemporary study of religion. Perspectives from diverse cultural settings employed to consider modern historical, philosophical, and social contexts that inform understandings of religion.—S. (S.) Couder, Janowitz, Miller, Syed

#### 200D. Field Profile Seminar I and II (1-2)

Project. Prerequisite: graduate standing or consent of instructor. Individually guided research to survey the field of study, under the supervision of a faculty member. Four units total over two or more quarters are required by the end of the second year. May be repeated for credit.—F, W, S. (F, W, S.)

#### 210A. Special Topics in American Religious Cultures (4)

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Comparative, interpretive study of the treatment of specific topics in American religious cultures. May be repeated for credit when topic differs. Offered irregularly.

#### 210B. Special Topics in Asian Religious Cultures (4)

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Comparative, interpretive study of the treatment of specific topics in Asian religious cultures. May be repeated for credit when topic differs. Offered irregularly.

**210C. Special Topics in Mediterranean Religious Cultures (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Comparative, interpretive study of the treatment of specific topics in Mediterranean religious cultures. May be repeated for credit when topic differs. Offered irregularly.

**230A. Thematic Topics—Body and Praxis (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Comparative, interpretive study of the treatment of religion through specific topics and themes relating to the body and praxis. May be repeated for credit when topic differs. Offered irregularly.

**230B. Thematic Topics—Language, Rhetoric, and Performance (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Comparative, interpretive study of the treatment of religion through specific topics and themes relating to language, rhetoric, and performance. May be repeated for credit when topic differs. Offered irregularly.

**230C. Thematic Topics—Modernity, Science, and Secularism (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Comparative, interpretive study of the treatment of religion through specific topics and themes relating to modernity, science, and secularism. May be repeated for credit when topic differs. Offered irregularly.

**230D. Thematic Topics—Theory and Method (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Comparative, interpretive study of the treatment of religion through specific topics and themes relating to theory and method. May be repeated for credit when topic differs. Offered irregularly.

**230E. Thematic Topics—Values, Ethics, and Human Rights (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Comparative, interpretive study of the treatment of religion through specific topics and themes relating to values, ethics, and human rights. May be repeated for credit when topic differs. Offered irregularly.

**230F. Thematic Topics—Visual Culture, Media, and Technology (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Comparative, interpretive study of the treatment of religion through specific topics and themes relating to visual culture, media, and technology. May be repeated for credit when topic differs. Offered irregularly.

**231B. Theories of Language (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing. Restricted to graduate students. Focuses on historical theories of language that precede and accompany post-structuralist theory. Intended to introduce graduate students to the context of modern theory formation. May cover structuralism, integrationism, and grammaticalization. Offered irregularly.—F, W, S. (F, W, S.) O'Keefe

**231E. History, Theory and Criticism of Human Rights (4)**

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Restricted to graduate students. Introduces the advanced study of Human Rights and the theoretical and practical elaboration of the international Human Rights system. Seminar will engage with criticism of Human Rights and develop research and teaching within disciplinary and interdisciplinary frameworks. (Same course as Human Rights 200A.) Offered in alternate years.—W. (W.) Waterpaugh

**298. Group Study (1-5)**

Prerequisite: graduate standing or consent of instructor. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

**299. Research (1-12)**

Prerequisite: graduate standing or consent of instructor. (S/U grading only.)—F, W, S. (F, W, S.)

**299D. Dissertation Writing (1-12)**

Prerequisite: advanced to candidacy for the Ph.D. program; consent of instructor. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## Surgery

**See Surgery (SUR), on page 453; and Surgical and Radiological Sciences (VSR), on page 584.**

## Surgical and Radiological Sciences

**See Veterinary Medicine, School of, on page 581.**

## Sustainable Agriculture and Food Systems

(College of Agriculture and Environmental Sciences)

Sustainable Agriculture and Food Systems is an interdisciplinary major hosted by the Department of Human Ecology.

Ryan Galt, Ph.D., Major Adviser

**Program Office.** 143 Robbins Hall;  
530-752-3915; <http://asi.ucdavis.edu>

**Committee in Charge**

Richard Sexton, Ph.D.

*(Agricultural & Resource Economics)*

Anita Oberbauer, Ph.D. *(Animal Science)*

Michael Parrella, Ph.D.

*(Entomology and Nematology)*

Susan Handy, Ph.D.

*(Environmental Science & Policy)*

Patsy Eubanks Owens, M.L.A.

*(Human Ecology)*

David Campbell, Ph.D. *(Human Ecology)*

Randal Southard, Ph.D.

*(Land, Air & Water Resources)*

David Rizzo, Ph.D. *(Plant Pathology)*

Chris van Kessel, Ph.D. *(Plant Sciences)*

**The Major Program**

The Sustainable Agriculture and Food Systems (SA&FS) major serves students interested in improving the sustainability of agriculture and food systems. This major prepares graduates to understand the interdisciplinary and systems-based aspects of sustainability and provides them with the knowledge, leadership skills and experiences required to excel in agricultural and food systems professions.

**The Program**

This program is designed to develop students' competencies for addressing the environmental, social, and economic challenges and opportunities associated with agricultural and food systems sustainability. The program emphasizes an experiential learning approach to sustainability education, allowing students to choose between three tracks within the major. Students in the Agriculture and Ecology track focus on crop and animal production systems, ecology, and practices that mitigate negative impacts while producing environmental and social benefits. Students in the Food and Society track focus on issues related to the social, cultural, political and community development aspects of agriculture and food systems. Students in the Economics and Policy track focus on issues related to agricultural and resource economics, policy and management.

The program provides students with practical experiences through courses with on- and off-campus field-work and through internship placements at sites related to students' interests and focus of study.

**Internships and Career Alternatives**

Sustainable Agriculture and Food Systems students are required to complete an internship in the field before graduation. Internships have been arranged with local, county, and state agricultural agencies, production farms and commercial processors and retailers, domestic and international non-governmental organizations, and rural and urban community development programs. Graduates are prepared to pursue a broad range of careers related to agricultural production and food system management, rural and urban community services, education and development, and agricultural and environmental sciences, as well as careers in agricultural, environmental, and economic policy and analysis. Positions may be in private industry, government and public service agencies and in the non-profit sector, nationally and internationally. The major also prepares students for graduate studies in a wide range of fields related to agriculture and food systems.

**B.S. Major Requirements:**

UNITS

**English Composition Requirement.....4-8**

See College requirement, must include Communications 1.

**Core Courses .....24-26**

Plant Sciences 15 .....	4
Community and Regional Development 20 .....	4
Plant Sciences 150 .....	4
Agricultural and Resource Economics 121 .....	4
Plant Sciences 190 .....	2-4
Environmental Science and Policy 191A, 191B .....	6

**Internship Requirement.....12**

Students must complete at least 12 units of internship, eight of which must be completed off campus.

**Applied Production .....6-9**

Select 1 course from: Plant Sciences 49, Plant Pathology 40, Viticulture and Enology 101A, 101B, 101C, Environmental Horticulture 120, Plant Science 131 .....	2-3
Select 1 course from: Animal Science 49AJ, Animal Science 41L .....	2-3
Select 1 course from: Applied Biological Systems Technology 49, 52, 101, 142 ..	2-3

**Track I: Agriculture and Ecology**

Focuses on crop and animal production systems, ecology, and practices that mitigate negative impacts while producing environmental and social benefits.

**Track I Adviser.** W. Horwath, Ph.D.**Preparatory Subject Matter .....60-61**

Mathematics 16A, 16B .....	6
Plant Sciences 120 or Statistics 100 .....	4
Chemistry 2A, 2B .....	10
Physics 1A .....	3
Biological Sciences 2A, 2B .....	10
Plant Sciences 2 .....	4
Animal Sciences 1 or 2 .....	4
Food Science 1 .....	3
Economics 1A .....	4
Community and Regional Development 1 ..	4
Select one course from: Philosophy 14, 15, 24 .....	4
Select one course from: Anthropology 2, Political Science 4, Sociology 1, Sociology 3 .....	4-5

**Depth Subject Matter.....34-38**

Agricultural and Resource Economics 120 or 147 .....	3-4
Environmental Science and Policy 161 or 169 .....	3-4
Soil Science 100 or Soil Science 109 .....	4-5

Select one course from: Animal Science 129, Environmental Horticulture 160 or, Environmental Science and Policy 100, Evolution and Ecology 101, Plant Sciences 105, 142, Wildlife, Fish, and Conservation Biology 154 ..... 4.5  
Additional upper-division restricted electives chosen in consultation with the track faculty adviser..... 20

**Track II: Food and Society**

Focuses on issues related to the social, cultural, political and community development aspects of agriculture and food systems.

**Track II Adviser.** R. Galt, Ph.D.

**Preparatory Subject Matter.....57-64**

Philosophy 5 or 31.....	4
Select one course from: Philosophy 14, 15, 24.....	4
Sociology 46B or Statistics 13 .....	4
Select at least one course from: Community and Regional Development 151, Applied Biological Systems Technology 180, Landscape Architecture 150, Statistics 103, Sociology 106 .....	3-6
Chemistry 2A .....	5
Biological Sciences 2A or 10 .....	5
Plant Sciences 2 .....	4
Select one course from: Evolution and Ecology 2 or Biological Sciences 2B or Environmental Science and Policy 1 or 30 or Wildlife, Fish, and Conservation Biology 10 or 11 .....	3-5
Food Science 1 .....	3
Soil Science 10.....	3
Economics 1A.....	4
Political Science 4 .....	4
Select one course from: Anthropology 2, Sociology 1, Sociology 3 .....	4.5
Community and Regional Development 1, 2 .....	8

**Depth Subject Matter .....43-44**

Agricultural and Resource Economics 112 or 150.....	4
Select 1 course from: Agricultural and Resource Economics 147, 176, Environmental Science and Policy 160, 161, 169, 172, 179 .....	3-4
Choose 12 units from: Anthropology 101, 102, Community and Regional Development 142, 152, Sociology 139, 144, 145A, 145B.....	12
Select 1 course from: American Studies 101C, 155, History 172 or Philosophy 109.....	4
Additional upper-division restricted electives chosen in consultation with the track faculty adviser.....	20

**Track III: Economics and Policy**

Focuses on issues related to agricultural and resource economics, policy and management.

**Track III Adviser.** T. Tomich, Ph.D.

**Preparatory Subject Matter.....60-64**

Mathematics 16A, 16B .....	6
Sociology 46B or Statistics 13 .....	4
Select 1 course from: Agricultural and Resource Economics 106, Statistics 103, Sociology 106 .....	4
Chemistry 2A .....	5
Biological Sciences 2A or 10 .....	5
Plant Sciences 2 .....	4
Select 1 course from: Evolution and Ecology 2, Biological Sciences 2B, Environmental Science and Policy 1, 30, Wildlife, Fish, and Conservation Biology 10, 11 .....	3-5
Food Science 1 .....	3
Soil Science 10.....	3
Economics 1A, 1B.....	8
Political Science 4 .....	4
Select 1 course from: Anthropology 2, Sociology 1, Sociology 3 .....	4.5
Community and Regional Development 1 ..	4

Select 1 course from: Philosophy 14, 15, 24..... 4

**Depth Subject Matter .....43-44**

Select one course from: Agricultural and Resource Economics 112, 150, 157 .....	4
Select 11-12 units from: Agricultural and Resource Economics 120, 130, 147, 176, Environmental Science and Policy 160, 161, 169, 172, 179 .....	11-12
Select 8 units from: Anthropology 101, 102, Community and Regional Development 142, 152, Sociology 139, 144, 145A, 145B... 8	
Additional restricted electives chosen in consultation with an adviser .....	20

**Total units for the major.....140-163**

**Major Adviser.** R. Galt (*Human Ecology*); **Track I Adviser.** W. Horwath (*Land, Air & Water Resources*); **Track II Adviser.** R. Galt (*Human Ecology*); **Track III Adviser.** T. Tomich (*Human Ecology, Environmental Science & Policy*)

**Advising Center** for the major is located in 1303 Hart Hall, Department of Human Ecology 530-752-2244.

**Courses in Sustainable Agriculture and Food Systems (SAF)****Lower Division****90X. SA&FS Portfolio (1-4)**

Workshop—3-12 hours. Prerequisite: consent of instructor. Restricted to Sustainable Agriculture and Food Systems majors with lower-division standing or consent of instructor. SA&FS Portfolios are designed to complement interdisciplinary, academic coursework by supporting student development of each of the SA&FS Student Learning Outcomes: Systems Thinking, Experimentation & Inquiry, Understanding Values, Interpersonal Communication, Strategic Management, Civic Engagement and Personal Development. May be repeated for credit. Offered irregularly. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

**92. Internship (1-12)**

Internship—3-36 hours. Prerequisite: consent of instructor. Restricted to Sustainable Agriculture and Food Systems majors or with consent of instructor. Lower-division internship for students enrolled in the Sustainable Agriculture and Food Systems program of study. Enrollment for non-majors by consent of instructor. May be repeated up to 12 units for credit with consent of instructor. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

**98. Directed Group Study (1-5)**

Prerequisite: consent of instructor. Restricted to Sustainable Agriculture and Food Systems major or with consent of instructor. Group study on focused topics in Sustainable Agriculture and Food Systems. Varies according to instructor. Course plan is adapted to student need and interest in conjunction with the expertise of the instructor. Offered irregularly. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

**99. Special Study for Undergraduates (1-5)**

Independent study—3-15 hours. Prerequisite: consent of instructor. Under faculty supervision, students pursue a special or individualized course of study related to Sustainable Agriculture and Food Systems. May be repeated for credit. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

**Upper Division****192. Internship (1-12)**

Internship—3-36 hours. Prerequisite: upper-division standing; consent of instructor. Restricted to Sustainable Agriculture and Food Systems majors or non-majors by consent of instructor. Upper-division internship for students enrolled in the Sustainable Agriculture and Food Systems program of study. May be repeated up to 12 units for credit. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

**197T. Tutoring in Sustainable Agriculture and Food Systems (1-5)**

Tutorial—3-15 hours. Prerequisite: upper division standing; consent of instructor. Undergraduates assist the instructor by tutoring students in regularly scheduled courses that fulfill SA&FS major requirements. May be repeated for credit. Offered irregularly. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

**197TC. SA&FS Tutoring in the Community (1-5)**

Tutorial—3-15 hours. Prerequisite: upper division standing; consent of instructor. Undergraduates assist the instructor by tutoring in the community in settings related to Sustainable Agriculture and Food Systems. May be repeated for credit. Offered irregularly. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

**198. Directed Group Study (1-5)**

Prerequisite: upper division standing; consent of instructor. Restricted to Sustainable Agriculture and Food Systems major or with consent of instructor. Group study on focused topics in Sustainable Agriculture and Food Systems. Varies according to instructor. Course plan is adapted to student need and interest in conjunction with the expertise of the instructor. May be repeated for credit. Offered irregularly. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

**199. Special Study for Advanced Undergraduates (1-5)**

Independent study—3-15 hours. Prerequisite: upper division standing; consent of instructor. Under faculty supervision, advanced students pursue a special or individualized course of study related to Sustainable Agriculture and Food Systems. May be repeated for credit. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

**Sustainable Environmental Design**

(College of Agriculture and Environmental Sciences)  
(Department of Human Ecology)

Steven E. Greco, Ph.D., Chairperson, Landscape Architecture and Environmental Design Program

**Program Office.** 131 Hunt Hall;  
530-752-3907; [http://humanecology.ucdavis.edu/ida/academic\\_programs/sed](http://humanecology.ucdavis.edu/ida/academic_programs/sed)

**Faculty**

Elizabeth Boultis, MLA Continuing Lecturer

David de la Pena, Ph.D., Assistant Professor

Steven E. Greco, Ph.D., Professor

Eric Larsen, Ph.D., Associate Research Scientist

Jeff Loux, Ph.D., Associate Adjunct Professor

Brett Milligan, M.L.A., Assistant Professor

N. Claire Napawan, M.L.A., Assistant Professor

Lorence Oki, Ph.D., Associate Specialist in Cooperative Extension

Patsy Eubanks Owens, M.L.A., Professor

Michael Rios, Ph.D., Associate Professor

Sheryl-Ann Simpson, M.L.A., Assistant Professor

Stephen Wheeler, Ph.D., Professor

**The Major Program**

The Sustainable Environmental Design major is intended to build student understanding and skills related to creation of sustainable communities and landscapes. Coursework emphasizes urban and environmental design, sustainable development theory and practice, green building, local government planning and decision-making, community dynamics and organizations, and written, graphic, and oral presentation of sustainability strategies.

**The Program**

The Sustainable Environmental Design major is particularly suited for students who are interested in the

physical form and design of communities and related public and private processes. It is focused on the physical environment of communities and the process of designing, planning for, and regulating the built landscape and the place-making considerations involved in creating sustainable communities.

### Career Alternatives

Graduates will choose to pursue work in government, community organizations, education, or the private sector. They will also be well-positioned to pursue graduate education in city and regional planning, landscape architecture, architecture, public policy, public administration, law, real estate, and related fields.

### B.S. Major Requirements:

UNITS

**Preparatory Subject Matter ..... 64**

English Writing/Oral Communication .....	8
Biological Sciences 2A, 2B.....	10
One course each in Statistics, Economics, Political Science, Physical Sciences, and Sociology.....	20
Landscape Architecture 1, 2, 3, 21, 30, 50, 70.....	26

**Depth Subject Matter ..... 21**

Landscape Architecture 140, 141, 142 .....	14
Environmental Science and Policy 171.....	4
Landscape Architecture 190 (three quarters).....	3

**Restricted Electives ..... 20-25**

Select 20 units of upper division courses chosen from courses related to community sustainability .....	20
Internship: Recommended.....	5

**Total units for the major ..... 105-110**

**Major Adviser.** Stephen Wheeler

**Advising Center.** See Sharla Cheney, 135 Hunt Hall, 530-754-8628, [scheneyc@ucdavis.edu](mailto:scheneyc@ucdavis.edu).

## Technocultural Studies

See Cinema and Digital Media, on page 207.

## Textile Arts and Costume Design

See Design, on page 233.

## Textile Science

See Fiber and Polymer Science, on page 338.

## Textiles (A Graduate Group)

Ning Pan, Ph.D., Chairperson of the Group

**Group Office.** 129 Everson Hall  
530-752-8035; [nerabaud@ucdavis.edu](mailto:nerabaud@ucdavis.edu)  
<http://textiles.ucdavis.edu>

### Faculty

Susan Avila, M.F.A. Professor (*Design*)  
Colin A. Carter, Ph.D., Distinguished Professor (*Agricultural and Resource Economics*)  
James Chalfant, Ph.D., Professor (*Agricultural & Resource Economics*)  
Hidergarde Heymann, Ph.D., Distinguished Professor (*Viticulture and Enology*)

Fall 2011 and on Revised General Education (GE): AH=Arts and Humanities; SE=Science and Engineering; SS=Social Sciences;

ACGH=American Cultures; DD=Domestic Diversity; OL=Oral Skills; QL=Quantitative; SL=Scientific; VL=Visual; WC=World Cultures; WE=Writing Experience

Pre-Fall 2011 General Education (GE): ArtHum=Arts and Humanities; SciEng=Science and Engineering; SocSci=Social Sciences; Div=Domestic Diversity; Wrt=Writing Experience  
Quarter Offered: F=Fall, W=Winter, S=Spring, Su=Summer; 2017-2018 offering in parentheses

You-Lo Hsieh, Ph.D., Distinguished Professor (*Textiles and Clothing*)  
Susan B. Kaiser, Ph.D., Professor (*Textiles and Clothing, Women and Gender Studies*)  
Helen Koo, Assistant Professor (*Design*)  
Ning Pan, Ph.D., Professor (*Textiles and Clothing, Biological and Agricultural Engineering*)  
Tingrui Pan, Ph.D., Associate Professor (*Biomedical Engineering*)  
Diana Strazdes, Associate Professor (*Art History*)  
Gang Sun, Ph.D., Professor (*Textiles and Clothing*)  
Susan Verba, M.F.A., Associate Professor (*Design Program*)

### Emeriti Faculty

Stephen Jett, Ph.D., Professor Emeritus (*Textiles and Clothing, Geography*)  
Joel T. Johnson, Professor (*Psychology*)  
Gyongy Laky, M.A., Professor Emeritus (*Textiles and Clothing*)  
Margaret H. Rucker, Ph.D., Professor Emeritus (*Textiles and Clothing*)  
Howard G. Schutz, Ph.D., Professor Emeritus (*Consumer Science*)  
James F. Shackelford, Ph.D., Professor Emeritus (*Chemical Engineering and Materials Science*)  
Charles F. Shoemaker, Ph.D., Professor Emeritus (*Food Science and Technology*)  
Jo Ann C. Stabb, M.A., Senior Lecturer Emeritus (*Design*)  
S. Haig Zeronian, Ph.D., Professor Emeritus (*Textiles and Clothing*)

**Graduate Study.** The Graduate Group in Textiles offers a program of study and research leading to the M.S. degree. Students in the program use an interdisciplinary approach emphasizing the physical and behavioral science aspects of textiles. Research areas include chemical, physical, biochemical, and mechanical properties of fibers and polymers as well as fibrous assemblies, including composites, paper, and nonwovens; and psychological and sociological factors relating to perception and consumption of textiles and apparel. Extensive specialized fiber, polymer, and textiles research facilities and a behavioral research laboratory are available. For detailed information regarding the program, address the Chairperson of the Group.

**Graduate Advisers.** Y.L. Hsieh, N. Pan

## Textiles and Clothing

(College of Agricultural and Environmental Sciences)

You-Lo Hsieh, Ph.D., Chairperson of the Division

**Division Office.** 129 Everson Hall  
530-752-6650; <http://textiles.ucdavis.edu>

### Faculty

You-Lo Hsieh, Ph.D., Professor  
Susan B. Kaiser, Ph.D., Professor (*Women and Gender Studies*)  
Ning Pan, Ph.D., Professor  
Gang Sun, Ph.D., Professor

### Emeriti Faculty

Stephen C. Jett, Ph.D., Professor Emeritus  
Gyongy Laky, M.A., Professor Emeritus  
Mary Ann Morris, Ph.D., Professor Emeritus  
Margaret H. Rucker, Ph.D., Professor Emeritus  
S. Haig Zeronian, Ph.D., D.Sc., Professor Emeritus

### The Major Program

The textiles and clothing major emphasizes the connections among (a) the physical characteristics of textile products, (b) human perceptions of and behavior toward these products, and (c) global economic trends affecting the textile/apparel marketplace. An integrative knowledge base links textile products with people and processes, to focus on the production, distribution, and consumer use of textiles and apparel; see also *Fiber and Polymer Science*, on page 338.

**The Program.** The textiles and clothing major offers two options: textile science and marketing/economics. The Textile Science option provides students with a broad knowledge base in both the social and physical sciences. This base includes production, end-use applications and care of textiles and apparel, physical and chemical properties of textiles, and social-psychological and economic aspects of textiles and clothing. The Marketing/Economics option emphasizes social science and business course work, while also providing students with an awareness of the physical nature of textile products.

**Internships and Career Alternatives.** Textiles and clothing majors can pursue internships and careers in apparel production and merchandising, retail management, international marketing, textile testing and conservation, and textiles journalism. The majority of textiles and clothing graduates accept entry-level management and technical positions within the textile and apparel industry or in related fields; e.g., merchandising and marketing, production, research and development, technical service and design. Students may also pursue graduate studies in textiles, business, and other areas depending on their specific selections of restricted elective course work.

### B.S. Major Requirements:

UNITS

**Preparatory Subject Matter ..... 42-44**

Plant Sciences 21 or Computer Science	
Engineering 15 or 30 .....	3-4
Economics 1A-1B .....	8
Anthropology 2, Science and Society 1, Art History 1A, 1B, 1C, or 1D .....	4
Physics 1A or 10.....	3-4
Psychology 1 .....	4
Sociology 2 .....	4
Statistics 13 .....	4
Textiles and Clothing 6, 7, 8.....	12

Select one of the following two options:

### Marketing/Economics option

**Additional Preparatory Subject Matter for the option ..... 18-19**

Management 11A-11B .....	8
Chemistry 10 or 2A.....	4-5
Mathematics 16A-16B .....	6

**Depth Subject Matter ..... 56-57**

Agricultural and Resource Economics 100A-100B, 106, 136 .....	16
Statistics 103 .....	4
Psychology 151 or Consumer Science 100.....	3-4
Fiber and Polymer Science 110, Textiles and Clothing 107, 162, 162L, 163, 163L, 164, 165, 171, 173, 174.....	33

**Restricted Electives ..... 12**

Courses selected from the following:  
Agricultural and Resource Economics 18, 112, 142, 155, 157, 171A, 171B, Anthropology 122A, 126A, Consumer Science 100, Design 77, 107, 143, Economics 101, 121A, 121B, 134, 162, and other relevant course work, Foreign language units may be used to satisfy any or all of the required 12 units, Mathematics 16C, Psychology 151, Sociology 123, 126, 140, 141, 145, Textiles and Clothing 180A, 180B, 230, 293, with consent of instructor, and a maximum of five units in either Textiles and Clothing 192 or 199.

### Textile Science option

**Additional Preparatory Subject Matter for the option ..... 19**

Chemistry 2A, 2B, 8A, 8B .....	16
Mathematics 16A.....	3

**Depth Subject Matter ..... 51-52**

Agricultural and Resource Economics 112, 113.....	8
Design 143 .....	4

Psychology 151 or Consumer Science 100.....	3-4
Fiber and Polymer Science 100, 161, 161L, Textiles and Clothing 107, 162, 162L, 163, 163L, 164, 165, 171, 173, 174 .....	36
<b>Restricted Electives.....</b>	<b>16</b>

Courses selected from the following:  
 Agricultural and Resource Economics 18, 141, 142, 155, 171A, 171B, Plant Sciences 120, Chemistry 2C, 128A, 128B, 128C, Communication 42, 130, 136, 140, Community and Regional Development 162, Consumer Science 100, Design 77, 107, 142A, 142B, 160A, 160B, 160C, 170A, 170B, 170C, Economics 100, 101, 121A, 121B, 134, Fiber and Polymer Science 110, Foreign Language units may be used to satisfy any or all of the required 16 units, Management 11A, 11B, Mathematics 16B, 16C, Psychology 151, Sociology 25, 123, 126, 140, 148, 159, 175, Statistics 106, 108; Textiles and Clothing 180A, 180B, 230, 293, with consent of instructor, and a maximum of five units in either Textiles and Clothing 192 or 199.

### Total Units for the Major ..... 128-132

#### Major Adviser. S. Kaiser

**Advising Center** for the major is located in 1204 RMI south 530-752-3250 or 129B Everson Hall 530-754-8368.

#### Minor Program Requirements:

The Division of Textiles and Clothing offers a minor program for non-majors interested in satisfying secondary career objectives. For acceptance into the program see the staff adviser in 129B Everson Hall.

#### UNITS

### Textiles and Clothing ..... 18

Textiles and Clothing 6, 7, or 8.....	4
Courses selected from: Fiber and Polymer Science 100, 110, 161, 161L, Textiles and Clothing 107, 162-162L, 163-163L, 164, 165, 171, 173, 174.....	14

#### Minor Adviser. G. Sun

### Courses in Textiles and Clothing (TXC)

Questions pertaining to the following courses should be directed to the instructor or to the Division of Textiles and Clothing. See also courses in *Fiber and Polymer Science*, on page 338.

#### Lower Division

##### 6. Introduction to Textiles (4)

Lecture—3 hours; laboratory—3 hours. Introduction to the structure and properties of textiles. Consumer use and fabric characteristics are emphasized. GE credit: SciEng | SE, SL, VL.—F. (F.) Sun

##### 7. Style and Cultural Studies (4)

Lecture/discussion—3 hours; discussion/laboratory—1 hour. The multiple and overlapping influences of gender, sexuality, ethnicity, and class on constructions of identity and community are explored through the study of style in popular culture and everyday life. Continuity and change in clothing and appearance styles are interpreted. GE credit: ArtHum or SocSci, Div, Wrt | AH or SS, VL, WC, WE.—W. (W.) Kaiser

##### 8. The Textile and Apparel Industries (4)

Lecture—4 hours. Textile and apparel industries including fashion theory, production, distribution, and consumption of textile goods. GE credit: SocSci, Div | SS.

##### 92. Internship in Textiles and Clothing (1-12)

Internship—3-36 hours. Prerequisite: consent of instructor. Work experience off campus in a textiles or clothing-related area. Supervision by a member of the Textiles and Clothing faculty. (P/NP grading only.)

##### 98. Directed Group Study (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

##### 99. Special Study for Lower Division Students (1-5)

(P/NP grading only.)

#### Upper Division

##### 107. Social and Psychological Aspects of Clothing (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Sociology 2. Social and cognitive factors influencing management and perception of personal appearance in everyday life. Concepts and methods appropriate to the study of meaning of clothes in social and cultural contexts. GE credit: SocSci, Div, Wrt | SS, VL, WE.—F. (F.)

##### 162. Textile Fabrics (3)

Lecture—3 hours. Prerequisite: course 6. Properties of fabrics as related to serviceability, comfort, and appearance. GE credit: SciEng | SE, VL.—W. (W.) Pan

##### 162L. Textile Fabrics Laboratory (1)

Laboratory—3 hours. Prerequisite: course 162 (may be taken concurrently). Laboratory methods and procedures employed in studying properties of textile fabrics as related to serviceability, comfort, and appearance. GE credit: SciEng | QL, SE, VL, WE.—W. (W.) Pan

##### 163. Textile Coloration and Finishing (3)

Lecture—3 hours. Prerequisite: course 6, Fiber and Polymer Science 110, or Chemistry 8B. Basic principles of textile dyeing, printing, and finishing; color theory; structure, properties, and application of dyes and finishes; factors affecting application and fastness; maintenance of dyed and finished textiles. GE credit: SciEng | SE, VL.—S. (S.) Sun

##### 163L. Textile Coloration and Finishing Laboratory (1)

Laboratory—3 hours. Prerequisite: course 163 (may be taken concurrently). Demonstrates various aspects of dyeing, printing, and finishing of textile substrates including the effect of fiber and finish type, and physical and chemical variables on dyeing and finishing processes and on the properties of the resultant textile. GE credit: SciEng | QL, SE, SL, WE.—S. (S.) Sun

##### 164. Principles of Apparel Production (3)

Lecture—3 hours. Prerequisite: course 6 or 8. Overview of characteristics, technology, processes, and research in apparel manufacturing industries including study of government statistics, material utilization and fabrication, mechanization, management, and production engineering. GE credit: SocSci | OL, SS, VL.

##### 165. Textile Processes (3)

Lecture/discussion—3 hours. Prerequisite: course 6. Physical processes involved in the production of textiles from the individual fiber to the finished fabric. Includes spinning, texturing, yarn formation, weaving preparation, weaving and knitting, tufting and fabric finishing. GE credit: SciEng | SE.

##### 171. Clothing Materials Science (4)

Lecture—3 hours; laboratory/discussion—3 hours. Prerequisite: course 6, 8, and senior standing. The properties, characterization, and performance evaluation of clothing materials and structures for specific functional applications. Principles and methods related to wetting and transport properties, fabric hand and aesthetic properties, clothing comfort, and material and assembly technology. GE credit: SciEng | SE, VL.—W. (W.) Hsieh

##### 173. Principles of Fashion Marketing (3)

Lecture—3 hours. Prerequisite: course 8, Economics 1A, Agricultural and Resource Economics 113 or 136. Study of basic elements of fashion marketing including philosophy and objectives, organization, merchandising, pricing, promotion and personnel. Offered in alternate years. GE credit: SocSci | SS, VL.—S.

##### 174. Introduction to World Trade in Textiles and Clothing (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 8. Structure of the global fiber/textile/apparel complex and its distribution patterns with an overview of political, economic and technological factors that are changing these industries and their markets. GE credit: SocSci, Div | SS, WC.—W. (W.)

##### 180A-180B. Introduction to Research in Textiles (2-2)

Laboratory—6 hours. Prerequisite: senior standing with textile-related major, and consent of instructor. Senior thesis on independent problems. Research begun in course 180A will be continued and completed in course 180B. (Deferred grading only, pending completion of sequence.) GE credit: SocSci | SS, WE.—F, W, S. (F, W, S.)

##### 192. Internship in Textiles and Clothing (1-12)

laboratory—3-36 hours. Prerequisite: consent of instructor. Work-learn experience off campus in a textiles or clothing-related area. Supervision by a member of the Textiles and Clothing faculty. (P/NP grading only.)

##### 197. Tutoring in Textiles and Clothing (1-5)

Discussion/laboratory—3-15 hours. Prerequisite: upper division textiles-related major and consent of instructor. Tutoring of students in Textiles and Clothing courses. Assistance with discussion groups and laboratory sections under supervision of instructor. May be repeated for credit if tutoring another textiles course. (P/NP grading only.)

##### 198. Directed Group Study (1-5)

(P/NP grading only.)

##### 199. Special Study for Advanced Undergraduates (1-5)

(P/NP grading only.)

#### Graduate

##### 230. Behavioral Science Concepts in Textiles (3)

Lecture—3 hours. Prerequisite: course 107, upper division or graduate course in statistics (e.g., Agricultural Management and Rangeland Resources 120) and one in a behavioral science (e.g., Psychology 145). Examination of theories and research concerning relationships between clothing and human behavior with emphasis on research techniques, including methods of measuring clothing variables. Offered in alternate years. —Kaiser

##### 290. Seminar (1)

Seminar—1 hour. Critical review of selected topics of current interest in textiles. (S/U grading only.)—F, W. (F, W.)

##### 290C. Research Conference (1)

Discussion—1 hour. Prerequisite: graduate standing; consent of instructor. Individual faculty members meet with their graduate students. Critical presentations of original research are made by graduate students. Research activities are planned. Discussions are led by major professors for their research groups. (S/U grading only.)—F, W, S. (F, W, S.)

##### 293. Recent Advances in Textiles (3)

Lecture—3 hours. Prerequisite: two upper division courses in Textiles and Clothing or consent of instructor. Critical reading and evaluation on selected topics of current interest in textiles. Multidisciplinary aspects of the topics selected will be stressed. May be repeated for credit. —(W.)

##### 298. Group Study (1-5)

##### 299. Research (1-12)

(S/U grading only.)

#### Professional

##### 396. Teaching Assistant Training Practicum (1-4)

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## Theatre and Dance

(College of Letters and Science)

David Grenke, Chairperson of the Department

**Department Office.** 101 Art Building

530-752-0888; Fax 530-752-8818

<http://arts.ucdavis.edu/theatre-dance>

### Faculty

Lawrence Bogad, Ph.D., Associate Professor

David Grenke, Professor

Lynette Hunter, Ph.D., Distinguished Professor

John Iacovelli, M.F.A., Professor

Peter Lichtenfels, Professor

Maggie Morgan, M.F.A., Professor

Jon D. Rossini, Ph.D., Associate Professor

### Emeriti Faculty

Bobbie J. Bolden, M.A., Senior Lecturer Emerita

Harry C. Johnson, M.A., Professor Emeritus

William E. Kleb, D.F.A., Professor Emeritus

### The Theatre and Dance Major Program

The Department of Theatre and dance facilities are complemented by an excellent faculty and production staff three times a year, as well as the Granada Artist-in-Residence program, which brings a major director, choreographer or playwright to the department three times a year. The faculty includes a group of distinguished scholars in history, theory and criticism whose research and teaching focuses on social engagement and activism. Students, both majors and non-majors, can audition for department productions or apply to the Institute for Exploration in Theatre, Dance and Performance to do related work.

The A.B. degree in Theatre and Dance provides students with an appreciation for an understanding of performance and its role in culture and society. The program offers a strong foundation in all aspects of drama, theatre, dance performance, and production. Students build significant skills in specific areas (including acting, directing, choreography, design, playwriting and devising, production skills and management) as well as achieving a broad knowledge of theatre and dance.

**Productions and Facilities.** Each year's schedule includes opportunities to work with professional directors and choreographers in three Granada Artists-in-Residence productions; the Main Stage Dance/Theatre Productions; Film Festival at UC Davis; projects generated through the Institute for Exploration in Theatre, Dance and Performance; and workshops and performance projects developed by M.F.A and Ph.D. students. These productions are staged in our proscenium (Main), thrust (Wyatt), black box (Arend), performance studio (Della Davidson Performance Studio)) and intimate laboratory theatre (Lab A), as well as in the Mondavi Center's Vanderhoef Studio Theatre and Jackson Hall. These productions are part of the academic program of the department and serve an important purpose in the study of theatre and dance. Participation is open to all students.

### A.B. Major Requirements:

UNITS

#### Preparatory Subject Matter ..... 24

Choose four units from Dramatic Art 21A, 40A, 40B, 42A, 42B.....4  
Dramatic Art 28, 55, 56A, 56B, 56C....20

#### Depth Subject Matter ..... 42

Two courses from Dramatic Art 142, 150, 155, 155A, 156A, 156B, 156C, 156D, 158, 159.....8  
One course from: Dramatic Art 124A, 124B, 124C, 124D, 124E, 126.....4  
One course from: Dramatic Art 120, 141, 144A, 146A .....,4  
One course from: Dramatic Art 127A, 140A, 160A .....,4  
Choose 6 units from at least 2 of: Dramatic Art 145, 180A, 180B, 180C .....,6  
Dramatic Art 180D.....4  
Choose 2 units from: Dramatic Art 180E, 180F, 180G .....,2  
Choose 16 additional units from: Dramatic Art 114, 115, 116, 120, 121A, 121B, 121C, 122A, 122B, 122C, 124A, 124B, 124C, 124D, 124E, 125, 126, 127A, 127B, 130, 135, 140A, 140B, 140C, 141, 142, 143, 144A, 144B, 145, 150, 154, 155A, 156A, 156B, 156C, 156D, 158, 159, 160A, 160B, 170 .....,16

At least 8 of these units must be in a specific area determined in consultation with a faculty adviser and reflecting preparation for the honors project.  
Dramatic Art 194A and 194B.....6  
Dramatic Art 195.....2

#### Total Units for the Major ..... 66

### A.B. with Honors Major Requirements:

UNITS

#### Preparatory Subject Matter ..... 24

Dramatic Art 28, 55, 56A, 56B, 56C ....20  
Choose 4 units from: Dramatic Art 21A, 40A, 40B, 42A, 42B .....,4

#### Depth Subject Matter ..... 56

Two courses from: Dramatic Art 142, 150, 155, 155A, 156A, 156B, 156C, 156D, 158, 159 .....,8  
One course from: Dramatic Art 124A, 124B, 124C, 124D, 124E, 126 .....,4  
One course from Dramatic Art 120, 141, 144A, 146A .....,4  
Once course from: Dramatic Art 127A, 140A, 160A .....,4  
Choose 6 units from at least 2 of: Dramatic Art 145, 180A, 180B, 180C .....,6  
Dramatic Art 180D.....4  
Choose 2 units from: Dramatic Art 180E, 180F, 180G .....,2  
Choose 16 additional units from: Dramatic Art 114, 115, 116, 120, 121A, 121B, 121C, 122A, 122B, 122C, 124A, 124B, 124C, 124D, 124E, 125, 126, 127A, 127B, 130, 135, 140A, 140B, 140C, 141, 142, 143, 144A, 144B, 145, 150, 154, 155A, 156A, 156B, 156C, 156D, 158, 159, 160A, 160B, 170 .....,16

At least 8 of these units must be in a specific area determined in consultation with a faculty adviser and reflecting preparation for the honors project.  
Dramatic Art 194A and 194B.....6  
Dramatic Art 195.....2

#### Total Units for the Major With Honors ... 80

**Major Adviser.** Consult Department office.

### Minor Program Requirements:

UNITS

#### Dramatic Art ..... 22

Two courses chosen from: Dramatic Art 142, 150, 155, 155A, 156A, 156B, 156C, 156D, 158, 159.....8  
Choose 8 additional units from: Dramatic Art 114, 115, 116, 120, 121A, 121B, 121C, 122A, 122B, 122C, 124A, 124B, 124C, 124D, 124E, 125, 126, 127A, 127B, 130, 140A, 140B, 140C, 141, 142, 143, 144A, 144B, 145, 150, 154, 155, 155A, 156A, 156B, 156C, 156D, 158, 159, 160A, 160B, 170 .....,8  
Dramatic Art 180D.....2  
Choose 4 units from: Dramatic Art 145, 180A, 180B, 180C, 180E, 180F, 180G...4

**Transfer Students.** As described above, all students completing a major in Theatre and Dance must participate in dramatic productions, including work in at least two of the following three areas: acting/dance; design (scenic, costume, lighting, painting, props, sound); directing/playwriting/stage management as well as crew assignments for a minimum of two productions while in residence at UC Davis.

Transfer students should see the major adviser for an evaluation of your previous experience.

**Guest Artists.** The Granada Visiting Artists Program brings distinguished professional artists to the campus each year, to be in residence for a quarter. These working professional artists interact closely with students in the classroom and rehearsal halls and provide them excellent pre-professional experiences of theater practice.

**Graduate Study.** The Department of Theatre and Dance offers programs of study and research leading to the M.F.A. in Theatre and Dance (the interdisciplinary weaving of acting, directing, design, choreography and practice and research) and contributing to the Graduate Group Ph.D. in Performance Studies. Detailed information may be obtained by contacting the Graduate Program Administrators: for the M.F.A. in Theatre and Dance 530-752-8710 and for the Graduate Group in Performance Studies 530-754-6973.

### Courses in Dramatic Art (DRA)

#### Lower Division

##### 1. Theatre, Performance and Culture (4)

Lecture—3 hours; discussion—1 hour. Introductory investigation of the nature of performance, moving from performance theory to consideration of various manifestations of performance including theatre, film and media, performance art, dance, sports, rituals, political and religious events, and other "occasions." Not open to students who have completed course 1S. GE credit: ArtHum, Div, Wrt | AH, DD, VL, WE.—S. Bogad

##### 1S. Theatre, Performance and Culture (4)

Lecture—3 hours; discussion—1 hour. Introductory investigation of the nature of performance, moving from performance theory to consideration of various manifestations of performance including theatre, film and media, performance art, dance, sports, rituals, political and religious events, and other "occasions." For Short Term Programs Abroad. Not open to students who have completed course 1. Offered irregularly. GE credit: ArtHum, Div, Wrt.

##### 2. Acting: The Basics: History and Practice (4)

Lecture—3 hours; discussion—1 hour. Introduction to the historical evolution of the actor—from ancient Greece & Asia to the Hollywood icon & postdramatic performer—and the practical foundations of acting for stage and screen. Onstage opportunities within lecture course structure. GE credit: AH, OL, VL.

##### 5. Understanding Performance: Appreciation of Modern Theatre, Dance, Film and Performance Art for the Humanities and Sciences (4)

Lecture/discussion—3 hours; laboratory/discussion—1 hour. Relevance of theatre and performance to modern culture, science and society. Approaches to theatre/dance/media/performance art, integrated into Mondavi Centre for the Arts and Theatre and Dance Department programs. (Same course as Science and Society 41.) GE credit: ArtHum, Div | AH, DD, OL, VL, WC, WE.

##### 10. Introduction to Acting (4)

Laboratory/discussion—4 hours. Fundamentals of movement, speech, theatre games, and improvisation. Selected reading and viewing of theatre productions. Intended for students not specializing in Dramatic Art. GE credit: OL, VL.

##### 11. Introduction to Presentation Skills (2)

Lecture/laboratory—4 hours. Class size limited to 20 students. Development of clear oral and physical communication skills that build confidence, presentational style and clarity for students whose command of English is at a basic level.

##### 14. Introduction to Contemporary Dance (4)

Lecture—3 hours; laboratory—3 hours. Introduction to basic issues and methods in contemporary dance. Focus on preparing the student for dancing and

dance-making through basic techniques of improvisation and composition. Consideration of dance as a cultural practice. GE credit: VL.

#### **20. Introduction to Dramatic Art (4)**

Lecture—3 hours; discussion—1 hour. Understanding and appreciation of both the distinctive and collaborative contributions of playwright, actor, director, and designer to the total work of dramatic art. Study of plays from the major periods of dramatic art in their cultural contexts. GE credit: ArtHum | AH, VL, WC, WE.

#### **21A. Fundamentals of Acting (4)**

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 20. Open to students planning to major in Theatre and Dance. Physical and psychological resources of the actor. Experience in individual and group contact and communication, theatre games, advanced improvisation, sound and movement dynamics. Viewing of theatre productions. GE credit: OL, VL.—Leavy, Merlin

#### **24. Visual Aspects of Dramatic Art (4)**

Laboratory/discussion—4 hours. Understanding and appreciation of the visual aspects of dramatic art: theatre architecture, scenery, lighting, costume, and makeup. GE credit: ArtHum | AH, VL.—Iacovelli, Morgan, Munn

#### **25. Technical Aspects of Dramatic Production (3)**

Lecture—3 hours. Technical principles of dramatic production emphasizing the three areas of scenic, costume and lighting studios. Subjects covered include basic tools, materials and equipment, production practices; and the interdisciplinary and collaborative nature of dramatic production.

#### **26. Performing Arts Production Management (3)**

Lecture—3 hours. Theoretical study of performing arts administration and backstage operations from audition through performance. Techniques of scheduling, production management, stage management, technical direction, audience control, box office, promotion, safety, accommodations for persons with disabilities and emergency procedures.

#### **28. Entertainment Engineering and Management: Stagecraft to Stage (4)**

Lecture/discussion—4 hours. Introduction to technical production and management in theatre and dance. Topics include stage management, theatrical mechanics, backstage protocols, scenic construction, properties, lighting, basic shop tools, costume shop use and construction, basic make-up, sound equipment, graphics and robotics for theatre. GE credit: ArtHum | AH.—S. (S.)

#### **30. Theatre Laboratory (1-5)**

Prerequisite: consent of instructor. Projects in acting, production, scene design, costuming, lighting, directing, and playwriting. Participation in departmental productions. May be repeated for credit up to 11 units.—F, W, S. (F, W, S.)

#### **40A. Beginning Modern Dance (2)**

Laboratory/discussion—4 hours. Prerequisite: course 14 or consent of instructor. Fundamentals of modern dance focusing primarily on the development of techniques and creative problem solving. Basic anatomy, dance terminology, and a general overview of modern dance history. May be repeated two times for credit. Non-dance majors can only repeat the course once. Dance majors may apply to the dance faculty adviser for permission to repeat more times. Dance is a repetitive practice that involves constant reiteration and demands this for improvement and better understanding of the somatic and proprioceptive skills. GE credit: AH, VL.

#### **40B. Intermediate Modern Dance (2)**

Laboratory/discussion—4 hours. Prerequisite: course 40A or consent of instructor. Open to students who have completed course 14 and 40A, unless with consent of instructor. Modern dance techniques. Basic anatomy, dance terminology and a general overview of modern dance history. May be

repeated one time for credit. For Dance majors, further repeats negotiated with faculty adviser in dance. GE credit: ArtHum | AH, VL.

#### **41A. Beginning Jazz Dance (2)**

Laboratory/discussion—4 hours. Prerequisite: consent of instructor. Fundamentals of jazz dance; includes warm-ups, dance techniques and combinations. Basic anatomy, dance terminology and general overview of jazz dance history. May be repeated one time for credit with consent of instructor.

#### **41B. Intermediate Jazz Dance (2)**

Laboratory/discussion—4 hours. Prerequisite: course 41A or consent of instructor. Warm-ups, dance techniques and combinations at the intermediate level. Basic anatomy, dance terminology and a general overview of jazz styles of historically significant jazz choreographers and leading contemporary jazz choreographers. May be repeated one time for credit with consent of instructor.

#### **42A. Beginning Ballet (2)**

Laboratory/discussion—4 hours. Fundamentals of ballet, focusing on the development of technique through proper alignment, quality, and rhythm. Basic anatomy, ballet terminology, and dance history. May be repeated for credit with consent of instructor. GE credit: AH, VL.

#### **42B. Intermediate Ballet (2)**

Laboratory/discussion—4 hours. Prerequisite: courses 42A or consent of instructor. Barre and center work at the intermediate level. Development and refinement of technique through proper alignment, rhythmic, and qualitative understanding. Anatomy, ballet terminology, and dance history. May be repeated for credit with consent of instructor. GE credit: AH, VL.

#### **43A. Contact Improvisation Dance (2)**

Lecture/laboratory—4 hours. Fundamentals of contact improvisation and its applications to all forms of dance, performance, sports, physical safety and health. Solo improvisation, safety, communication, alignment, basic lifting and weight-sharing, intuition, developing relaxed readiness and personal expression. May be repeated two times for credit. Offered irregularly. GE credit: AH, VL.

#### **43B. Intermediate Contact Improvisation (2)**

Lecture/laboratory—4 hours. Prerequisite: course 43A or consent of instructor. Building on the fundamentals. Reviewing basics, extended improvising, skillfully working with partners of different sizes and abilities, advanced lifting, advanced safety practices, embracing risk and disorientation, subtle nuances of communication. May be repeated two times for credit. GE credit: ArtHum | AH, VL.

#### **44A. Beginning Hip Hop Dance (2)**

Laboratory/discussion—4 hours. Fundamentals of Hip Hop dance focusing on developing a fluid movement vocabulary, facility in body isolations, intricate rhythmic patterning, quick shifts of weight and mastering dance combinations. Discussions on Hip Hop dance history, styles and terminology. May be repeated one time for credit.

#### **44B. Intermediate Hip Hop Dance (2)**

Laboratory/discussion—4 hours. Prerequisite: course 44A or consent of instructor. Expansion of Hip Hop dance vocabulary by focusing on mastering body isolations and intricate rhythmic techniques, complex dance combinations, advanced across the floor sequences. May be repeated one time for credit.

#### **55. Contemporary Local, National and Global Theatre, Dance and Performance (4)**

Lecture/discussion—4 hours. Introduction a range of contemporary theatre, dance and performance in local, national and international settings. Training in critical approaches to and aesthetic appreciation of these forms. Emphasis varies based on instructor. GE credit: ArtHum | AH, DD, VL, WC.

#### **56A. History of Theatre and Dance I: Myth, Magic and Madness (4)**

Lecture/discussion—4 hours. Exploration of aesthetic movements in various disciplines of theatre and dance from the origins to 1550. Examination of Greek, Roman, Sanskrit, Kathakali, Chinese, Japanese, Mesoamerican, Medieval European, and Indigenous theatre and dance including oral, ritual and shamanic performance. Offered once a year. GE credit: ArtHum | AH, VL, WC.

#### **56B. History of Theatre and Dance II: Romance, Revenge and Rebellion (4)**

Lecture/discussion—4 hours. Exploration of aesthetic movements in various disciplines of theatre and dance from 1550 to 1850. Examination of genres related to romance, revenge and rebellion using European, North and South American, and Asian examples. Offered once a year. GE credit: ArtHum | AH, VL, WC.

#### **56C. History of Theatre and Dance III: Sex, Society and the State (4)**

Lecture/discussion—4 hours. Exploration of aesthetic movements in various disciplines of theatre and dance from 1850-1968. Examination of melodrama, popular theatre, naturalism, psychological realism, and the avant-garde using European, North and South American, Asian, and African examples. Offered once a year. GE credit: ArtHum | AH, VL, WC.—F, W, S. (F, W, S.)

#### **92. Internship in Dramatic Art (1-12)**

Prerequisite: consent of instructor and department chairperson. Restricted to lower division students with less than 84 units completed. Internship outside the Department of Theatre and Dance enabling students to practice their skills. May be repeated up to 12 units for credit. (P/NP grading only.)

#### **98. Directed Group Study (1-5)**

Primarily for lower division students. (P/NP grading only.)

#### **99. Special Study for Undergraduates (1-5)**

(P/NP grading only.)

#### **Upper Division**

#### **111. Advanced Presentation Skills (2)**

Lecture/laboratory—4 hours. Class size limited to 20 students. Development of clear oral and physical communication skills that build confidence, presentational style and clarity for students whose command of English is at a competent to fluent level. GE credit: OL.

#### **111S. Representation and Identity in Culture and Cinema (4)**

Lecture/discussion—2 hours; film viewing—4 hours. Issues of personal and collective identity via study of film narratives from different cultures. Reflection of dominant cultural identities in film. Taught in Australia. GE credit: ArtHum, Div, Wrt.

#### **114. Theatre on Film (4)**

Lecture/discussion—3 hours; film viewing—2 hours; term paper. Prerequisite: consent of instructor. Study of six/eight plays on film, using mixed casts and raising issues of diversity. Focus: sociohistorical context for production and reception, interpretation and analysis of topics (gender, ethnicity, age, politics, philosophy), and filming, screenwriting, design, and acting/directing for film. GE credit: ArtHum or SocSci, Div, Wrt | Ah or SS, VL.

#### **115. Advanced Study of Major Film Makers (4)**

Lecture/discussion—3 hours; film viewing—2 hours. Analysis of the contribution of some outstanding film creators. Study of diverse aesthetic theories of the cinema and their application to selected films. May be repeated for credit when different film creator studied, or studied with a different methodological approach. GE credit: VL.

#### **116. Design on Screen (4)**

Lecture/discussion—3 hours; film viewing—3 hours. Analysis of the contribution of outstanding designers for cinema, television and filmed entertainment. Study of diverse aesthetic theories of production design and art direction, costume design, or cinema-

tography. Introductory principles and practice, history. May be repeated two times for credit when topic differs. (Same course as Cinema and Technocultural Studies 116.) Offered irregularly. GE credit: ArtHum | AH, VL.—Iacovelli, Morgan

#### **120. Intermediate Acting/Gateway: The Actor's Toolkit (4)**

Lecture/laboratory—6 hours. Prerequisite: course 21A or consent of instructor. Limited enrollment. Implementation of acting tools drawn predominantly from Stanislavsky's 'system'. Gateway into the Advanced Acting courses. GE credit: OL, VL.—Leavy, Merlin

#### **121A. Advanced Acting: Scene Study and Script Analysis (4)**

Lecture/laboratory—6 hours. Prerequisite: course 120 and consent of instructor. Limited enrollment. In-depth study, analysis and performance of texts from different eras, genres and styles. Implementation of tools to undertake independent preparation of character creation. May be repeated up to eight units for credit. Since acting requires repetition to habituate the body and imagination to new practices, this course may be taken twice. New scripts and scenes must be undertaken in the repetition. Offered in alternate years. GE credit: OL, VL.

#### **121B. Advanced Acting: Rehearsal Processes and Practices (4)**

Lecture/laboratory—6 hours. Prerequisite: course 120 and consent of instructor. Limited enrollment. Development of rehearsal practice and etiquette, using a variety of scenes from different eras and genres. May be repeated up to eight units for credit. The course has been established to enable visiting artists in residence to undertake the instruction, as well as faculty. Therefore, this course may be taken twice, as students will be exposed to different professional practitioners' working processes. New etudes, scripts and scenes must be undertaken in the repetition. Offered irregularly. GE credit: OL, VL.

#### **121C. Advanced Acting: Character and Style (4)**

Lecture/laboratory—6 hours. Prerequisite: course 120 and consent of instructor. Limited enrollment. Study of psycho-physical techniques to create characters with an emphasis on non-realistic styles. May be repeated up to eight units for credit. Since acting requires repetition to habituate the body and imagination to new practices, this course may be taken twice. New scripts and scenes must be undertaken in the repetition. Offered in alternate years. GE credit: ArtHum | OL, VL.

#### **122A. Advanced Acting: Devising and Collaboration (4)**

Lecture/laboratory—6 hours. Prerequisite: course 120 and consent of instructor. Limited enrollment. Study and practice of various devising techniques, to collaborate on and produce a series of short etudes and dramatic scenes/short plays. May be repeated up to eight units for credit. Since acting requires repetition to habituate the body and imagination to new practices, this course may be taken twice. New scripts and scenes must be undertaken in the repetition. GE credit: OL, VL.—Lichtenfels

#### **122B. Advanced Acting: Shakespeare and His Contemporaries (4)**

Lecture/laboratory—6 hours. Prerequisite: course 120 and consent of instructor. Limited enrollment. Study and performance of classical texts (monologues and dialogues), with a focus on Shakespeare and the Elizabethan world view. May be repeated up to eight units for credit. Since acting requires repetition to habituate the body and imagination to new practices, this course may be taken twice. New monologues and scenes must be undertaken in the repetition. Offered in alternate years. GE credit: OL, VL.—Lichtenfels

#### **122C. Advanced Acting: Special Topics in Acting (4)**

Lecture/laboratory—6 hours. Prerequisite: course 120 and consent of instructor. Restricted to Theatre and Dance majors; limited enrollment. Intensive study and practical exploration of a specialized

area; for example, World Theatre, Social Theatre, Physical Theatre, Musical Theatre, the Ancient Greeks, etc. May be repeated up to eight units for credit. Offered irregularly. GE credit: AH, OL, VL.

#### **124A. Principles of Theatrical Design: Scenery (4)**

Lecture/discussion—4 hours. Prerequisite: course 24 or consent of instructor. Pass One restricted to Theatre and Dance majors. Scene design processes, working drawings, sketching techniques, scale models, methods and materials of scenery construction. GE credit: ArtHum | AH, VL.—Iacovelli

#### **124B. Principles of Theatrical Design: Scenery (4)**

Lecture/discussion—4 hours. Prerequisite: course 24 or consent of instructor. Pass One restricted to Theatre and Dance majors. Analysis of plays in terms of scene design, elements of design, execution of designs for modern and period plays. GE credit: ArtHum | AH, VL.—Iacovelli

#### **124C. Principles of Theatrical Design: Lighting (4)**

Lecture/discussion—4 hours. Prerequisite: course 24 or consent of instructor. Pass One restricted to Theatre and Dance majors. Theories of lighting the stage, equipment and control systems, execution of lighting plots. GE credit: ArtHum | AH, VL.

#### **124D. Principles of Theatrical Design: Costume (4)**

Lecture/discussion—4 hours. Prerequisite: course 24 or consent of instructor. Pass one restricted to Theatre and Dance majors. Source materials for theatrical costuming, selecting fabrics, elements of design, analysis of plays in terms of costume design, execution of designs for modern and period plays. GE credit: ArtHum | AH, OL, VL.—Morgan

#### **124E. Costume Design for Film (4)**

Lecture/discussion—4 hours. Prerequisite: for Dramatic Art majors; course 24 or 124D or consent of instructor. Theory and practice of the art and business of film costume design. Script analysis, costume research, developing design concepts, budgeting, and current production practices and methods. Execution of designs for period and contemporary films. Viewing of current films. (Same course as Cinema and Technocultural Studies 124E.) GE credit: ArtHum | AH, OL, VL.—Morgan

#### **125. Scenic Painting: Studio (4)**

Lecture—2 hours; studio—1 hour; laboratory—3 hours. Prerequisite: upper division standing in Theatre and Dance, Art Studio, or Design; or course 24 or 28 or consent of instructor. Scene painting techniques, practices and materials including color mixing and matching, wood graining, faux painting techniques, glazing, creating foliage, stone and brick. May be repeated one time with consent of instructor. Offered irregularly. GE credit: ArtHum | AH, VL.—Iacovelli

#### **126. Principles of Performing Arts Stage Management (4)**

Lecture/discussion—3 hours; laboratory—3 hours. Stage management principles for theatre, dance, musical theatre, music, and concerts. The dynamical role of the stage manager in the performing arts, upper-management team.

#### **127A. Principles of Directing (4)**

Lecture—2 hours; laboratory—4 hours. Prerequisite: consent of instructor. Director's creative approach to the play and to its staging. GE credit: VL.—Lichtenfels

#### **127B. Principles of Directing (4)**

Lecture—2 hours; laboratory—4 hours; rehearsal. Prerequisite: course 127A or consent of instructor. Director's creative approach to the actor. GE credit: VL.—Lichtenfels

#### **128. Principles of Theatre Sound (3)**

Lecture/discussion—2 hours; laboratory—3 hours. Fundamentals of sound, sound equipment, and sound design as used in modern theatre and other performance venues. Assembly, set-up, and operation of basic theatre sound reinforcement system, recording system, and theatrical playback system.

#### **130. Approaches to Theatrical Design: Practice and Theory (4)**

Seminar—2 hours; studio—4 hours. Prerequisite: upper division standing in Theatre and Dance, Art Studio or Design; any class from course 124 series or consent of instructor. Advanced design study in specific areas including but not limited to: research, design styles and concepts, new materials and techniques, scenery, lighting, costume, makeup, photography, projections, computer technology, spectacle and special effects, and alternative theatre forms and genres. May be repeated three times for credit when topic differs; when instructor differs. Offered irregularly. GE credit: ArtHum | AH, VL.—Iacovelli, Morgan

#### **135. Voice in Performance (2)**

Performance instruction—4 hours. Prerequisite: course 21B or consent of instructor. Progression of exercises to free, develop and strengthen the voice, as a human and then as an actor's instrument with emphasis on how the voice works, to freeing the channel for sound, to interpersonal communication. May be repeated two times for credit.

#### **140A. Dance Composition (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 40A or 41A or 42A or consent of instructor. Introduction to the craft of choreography. Compose phrases and present movement studies based on the elements of choreography: motivation, space, time, force/energy. GE credit: VL.—Grenke

#### **140B. Dance Composition (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 140A. Continuation of the study of choreography, focusing on the development of group choreography: duets, trios, quartets and group work, form, and accompaniment.—Grenke

#### **140C. Dance Composition (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 140A, 140B. Continuation of study of choreography focusing on sequencing movements for groups. The relation between dance and allied mediums of music, sets, costumes and lighting. Students conceptualize a choreographic issue and explore it through creation of short dance studies.—Grenke

#### **141. Introduction to the Fundamentals of Movement (4)**

Lecture/discussion—4 hours. Introduction to fundamentals of movement that combines intellectual and kinesthetic understanding of the body's skeletal and muscular systems. Explorations based on theories of various body mind specialists including Laban, Feldenkrais, Bartenieff and Sweigard as well as the eastern discipline of Yoga. GE credit: VL.

#### **142. History of Modern Dance (4)**

Lecture/discussion—4 hours. Modern Dance tradition, focusing on its theorizations of individual and social identity. Students will write and choreograph analyses of principle dances in this tradition. Offered in alternate years. GE credit: ArtHum | AH, VL, WE.—Grenke

#### **143. Dance and Movement Studio (1-4)**

Laboratory/discussion—2-8 hours. Prerequisite: consent of instructor. Special studies in dance and movement such as African, Balinese, Baroque, Chinese, European, and stage combat. Offered as needed for stage productions. May be repeated up to eight units for credit. GE credit: AH, VL.

#### **144. Introduction to Traditional Chinese Physical Culture (4)**

Lecture/discussion—4 hours. Traditional Chinese Wushu practices, explored through practical work in dance laboratory conditions. Integration of practice with conceptual analysis; contemporary social, educational and artistic applications. GE credit: ArtHum or SocSci, DIV | AH, SS.—Hunter

#### **144A. Introduction to Traditional Chinese Embodied Culture (4)**

Laboratory/discussion—4 hours. Traditional Chinese Wushu practices, explored through practical work in dance laboratory conditions. Integration of

practice with conceptual analysis; contemporary social, educational and artistic applications. GE credit: AH or SS, DD, VL, WC.—Hunter

#### **144B. Traditional Chinese Physical Culture (4)**

Lecture/discussion—4 hours. Prerequisite: course 144A. Traditional Chinese Wushu practices, explored through practical work in dance laboratory conditions. Integration of practice with conceptual analysis; contemporary social, educational and artistic applications. May be repeated two times for credit when content and instructor varies and if student progression is required. GE credit: ArtHum or SocSci, Div | AH or SS, DD, VL, WC.—Hunter

#### **144C. Daoist Philosophy in Traditional Chinese Movement Culture (4)**

Lecture/discussion—4 hours. Prerequisite: course 144B. Daoist practices of movement and their relation to daoist philosophy, explored through work in dance laboratory conditions. Integration of practice with conceptual analysis, and critical philosophy around values and ethical action. May be repeated two times for credit when content or instructor varies and if student progression is required. GE credit: ArtHum | AH, DD, VL, WC.—Hunter

#### **145. Directed Choreography Projects (4)**

Lecture/laboratory—6 hours. Prerequisite: courses 140A, 140B, 140C or consent of instructor. Conceptualization, creation, casting, rehearsing, and concert presentation of complete dances, with students integrating elements of stagecraft and directing the on-stage rehearsals.—Grenke

#### **146A. Professional Track Modern Dance I (4)**

Lecture/laboratory—6 hours. Prerequisite: course 146A; consent of instructor. Professionally oriented performance training. Rigorous, consistent training regimen based on traditional modern dance technique. Breath and voice, skeletal and muscular placement, moving from the spine, contraction technique, movement intention. May be repeated two times for credit. GE credit: VL.—Grenke

#### **146B. Professional Track Modern Dance II (4)**

Lecture/laboratory—6 hours. Prerequisite: courses 40B and 146A; consent of instructor. Continuation of course 146A. Body and space relationships in solos, duets and group work; stylistic variations of Graham technique; works of Paul Taylor. May be repeated one time for credit. GE credit: VL.—Grenke

#### **146C. Professional Track Modern Dance III (4)**

Lecture/laboratory—6 hours. Prerequisite: courses 40B, 146A and 146B; consent of instructor. Continuation of course 146B. Time as a theatrical device, sustaining movement and non-movement, phrasing, musicality. May be repeated one time for credit. Offered irregularly. GE credit: VL.—Grenke

#### **150. American Theatre and Drama (4)**

Lecture—4 hours. The history of the theatre from Colonial times to the present. Readings of selected plays. Offered in alternate years. GE credit: ArtHum, Div, Wrt | ACGH, AH, DD, VL, WE.

#### **151S. Australian Performance and Culture (4)**

Lecture/discussion—2 hours; seminar—2 hours. Australian performance and theatre practices as a product of its culture of origin. Relationships between art and society. Taught in Australia. GE credit: ArtHum.

#### **154. Asian Theatre and Drama: Contexts and Forms (4)**

Lecture/discussion—4 hours. Selected Asian plays and performance forms in their cultural and artistic contexts; myth, ritual and the theatre; performance training, visual presentation of the text; political theatre; intercultural performance—the fusion of Asian and Western traditions. Offered in alternate years. GE credit: ArtHum, Div, Wrt | AH, WC, WE.

#### **155. Representing Race in Performance (4)**

Lecture—4 hours. Representation and performance of "race" in American culture featuring different sub-headings such as "African American Theatre" or "Asian-Americans on Stage." May be repeated one time for credit when topic differs. GE credit: ArtHum, Div, Wrt | AH, DD, WE.—Rossini

#### **155A. African American Dance and Culture in the United States, Brazil and the Caribbean (4)**

Lecture/discussion—4 hours. Comparative study of the African American dance forms in the U.S.A., Brazil, Haiti, Cuba, Jamaica, Barbados, and Trinidad. Examination of ritual, folk, and popular dance forms and the socio/historical factors that have influenced these forms. (Same course as African American and African Studies 155A.) Offered in alternate years. GE credit: ArtHum | AH, VL, WC.

#### **155B. Ancient and Contemporary Greek Theatre and Dance (6)**

Discussion/laboratory—10 hours; performance instruction—10 hours; seminar—13 hours. Origins of early theatres and the first actors, playwrights and dancers and their powerful influence on western performance and thought up to present day. Offered in Greece. GE credit: ArtHum | AH.

#### **156AN. Performance Analysis (4)**

Lecture—3 hours; discussion—1 hour. Performance on the stage, in the street, in everyday life, ritual, and in politics. Satire, irony, creative protest and performance. Social movements, the state, and performance as tactical intervention. GE credit: ArtHum, Div, Wrt | AH, DD, WE.—Bogad

#### **156B. Theatre in History and Place: Local, National and Global Conditions for Production (4)**

Lecture—3 hours; discussion—1 hour. Exploration of local, national and global issues in theatre production, with special attention to historical changes in social and political contexts for performance. GE credit: ArtHum, Div, Wrt | AH, WC, WE.—Hunter

#### **156C. Modern Aesthetic Movements in Performance (4)**

Laboratory/discussion—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Important movements in performance, especially theatre and dance, from realism to the present. Primary emphasis on Western traditions though others may be studied. GE credit: ArtHum, Div, Wrt | AH, WE.

#### **156D. Theatre History through Shakespeare (4)**

Lecture—4 hours; extensive writing. Shakespeare's plays, theatre history, and theatre today. European contexts from 1590-2004 and international theatre from 20th century. Stagecraft, different media (print, stage, film), social/political environments, design, and cultural change (gender, sexuality and ethnicity). May be repeated one time for credit. ArtHum, Div, Wrt | AH, OL, WC, WE.

#### **158. Performance Studies Undergraduate Seminar (4)**

Seminar—4 hours. Prerequisite: course 156AN recommended; consent of instructor. Focused inquiry into a particular genre, period, movement, artist, or theme in performance. Philosophical and aesthetic issues as well as historical and cultural performance contexts. In-depth research projects in relationship to the subject of inquiry. May be repeated for credit. Offered irregularly. GE credit: Wrt.—Bogad

#### **159. Contemporary Experimental Performance, Theatre and Drama (4)**

Lecture/discussion—3 hours; extensive writing. Evaluation and examination of the "New Theatre;" its experimental and innovative nature since the 1960s. Dance, film, stage, performance art and public acts of a performative nature. May be repeated three times for credit when topic differs. GE credit: AH, DD, VL, WC, WE.

#### **159S. Contemporary Experimental Performance, Theatre and Drama (4)**

Lecture/discussion—4 hours. Evaluation and examination of the "New Theatre" – its experimental and innovative nature since the 1960s. Dance, film, stage, performance art and public acts of a performative nature. May be repeated up to 12 units for credit if instructor or content varies. Offered irregularly. GE credit: ArtHum | AH, WE.—Su.

#### **160A. Principles of Playwriting (4)**

Lecture/discussion—4 hours. Prerequisite: two courses in Theatre and Dance or related courses in other departments; consent of instructor. Analysis of dramatic structure; preparation of scenarios; the composition of plays. GE credit: WE.—Rossini

#### **160B. Principles of Playwriting (4)**

Lecture—4 hours. Prerequisite: course 160A; consent of instructor. Analysis of dramatic structure; preparation of scenarios; the composition of plays. GE credit: WE.—Rossini

#### **170. Media Theatre (4)**

Lecture—1 hour; rehearsal—2 hours; performance instruction—1 hour. Prerequisite: consent of instructor. New media and application of in theatre devising and performance. Emphasis on collaborative process in relationship to integration of emerging technologies and formation of new theatrical works. Development of collaborative performance through lecture, demonstration, improvisation and experimentation. May be repeated one time for credit. GE credit: ArtHum | AH, VL.

#### **174. Acting for Camera (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: consent of instructor. Analysis and practice of acting skills required for camera work and digital media. May be repeated eight times for credit when instructor differs. (Same course as Cinema & Technocultural Studies 174.)

#### **175. Small Scale Film Production (4)**

Lecture/laboratory—6 hours. Prerequisite: consent of instructor. Lecture and intensive workshop teaching small-scale film production. Appointments as a(n) director, director of photography, actor, writer, lighting designer, sound designer and other critical positions are used to produce and submit a short film to a film festival. (Same course as Technocultural Studies 175.) May be repeated two times for credit.

#### **180. Theatre Laboratory (1-5)**

Prerequisite: consent of instructor. Projects in acting, production, scene design, costuming, lighting, directing, and playwriting. Participation in departmental productions. May be repeated for credit.—F, W, S. (F, W, S.)

#### **180A. Theatre Laboratory: Performance (1-5)**

Rehearsals—12 hours. Prerequisite: consent of instructor. Limited enrollment. Rehearsals and performance of a production directed or choreographed by visiting Granada Artists-in-Residence and/or faculty, and/or the UG Edge Festival. May be repeated for credit. Since each production involves different scripts, directions, challenges of rehearsal practices and performance processes, it is possible for students to appear in a variety of productions in the course of their education. Admission by audition.

#### **180B. Theatre Laboratory: Design (1-4)**

Prerequisite: consent of instructor. Design-related participation in theatre and dance productions involves research, creation and implementation of design concept in collaboration with the director and other members of the production team. May be repeated for credit. Because each theatrical piece is conceived and produced afresh with new source material, scripts, and production style the challenges and assignments for the designers will be new each and every time they design a show. GE credit: ArtHum | AH, VL.

#### **180C. Theatre Laboratory: Management, Directing, other Production Team (1-5)**

Prerequisite: consent of instructor. Participation in theatre and dance production in management, direction, choreography, dramaturgy, writing or other

production related role; research, creation and implementation of production concept in collaboration with members of the production team and cast. May repeat multiple times but only for a total of five units. Permission to repeat is required from the Dramatic Art department. GE credit: ArtHum | AH, VL.

#### **180D. Theatre Laboratory: Crew (2-4)**

Laboratory—6-12 hours. Prerequisite: consent of instructor. Participation in theatre and dance productions as backstage running crew which will involve skill development, rehearsal and execution of performance. May be repeated for credit.

#### **180E. Theatre Laboratory: Scenic (1-4)**

Laboratory—3-12 hours. Prerequisite: consent of instructor. Practical experience working on scenery and properties for theatre and dance department productions. Study and execution of basic scenery and prop engineering, construction, painting, rigging. Study of techniques, materials, tools, and equipment use. Skill development, professional etiquette. Safety training requirement. May be repeated for credit.

#### **180F. Theatre Laboratory: Costume (1-4)**

Laboratory—3-12 hours. Prerequisite: consent of instructor. Practical experience working on costumes for theatre and dance department productions. Study and execution of basic costume construction techniques and materials, tools, and equipment use. Skills development, professional etiquette. Safety training requirement. May be repeated for credit. —F, W, S. (F, W, S.)

#### **180G. Theatre Laboratory: Lighting/Sound/Projection (1-4)**

Laboratory—3-12 hours. Prerequisite: consent of instructor. Practical experience working on lighting, sound or projections for theatre and dance department productions. Study and execution of basic techniques, materials, tools, and equipment use. Skill development, professional etiquette. Safety training requirement. May be repeated for credit.

#### **192. Internships in Theatre and Dance (1-12)**

Internship—3-36 hours. Theatre production experience in creative, technical or management areas. Experience in galleries, performance sites, or theatre/dance/physical theatre companies. May be repeated for credit for a total of 12 units. Not open to students who have completed course 192S. (P/NP grading only.)

#### **192S. Internships in Theatre and Dance (1-12)**

Internship—3-36 hours. Theatre production experience in creative, technical or management areas. Experience in galleries, performance sites, or theatre/dance/physical theatre companies. This course is offered in Sydney, Australia. May be repeated for credit for a total of 12 units. Not open to students who have completed course 192. Offered irregularly. (P/NP grading only.)

#### **194HA. Special Study for Honors Students (3)**

Independent study—9 hours. Prerequisite: qualification for Letters and Science Honors Program and admission to Theatre and Dance Senior Honors Program. Preparation and presentation of a culminating project, under the supervision of an instructor, in one of the creative or scholarly areas of Dramatic Art. (Deferred grading only, pending completion of sequence).

#### **194HB. Special Study for Honors Students (3)**

Independent study—9 hours. Prerequisite: qualification for Letters and Science Honors Program and admission to Theatre and Dance Senior Honors Program. Preparation and presentation of a culminating project, under the supervision of an instructor, in one of the creative or scholarly areas of Dramatic Art. (Deferred grading only, pending completion of sequence).

#### **195. Senior Capstone Experience (2)**

Project; lecture/discussion—1 hour. Open to Theatre and Dance Majors who have completed 135 or more units. Capstone experience for majors. Examination, reflection and synthesis on development. Discussion of professional development and translatable skills. Individual project and development of portfolio. (P/NP grading only.) GE credit: ArtHum | AH, VL.

#### **197T. Tutoring in Dramatic Art (1-5)**

Tutoring—1-5 hours. Prerequisite: upper division or graduate standing with major in Theatre and Dance; consent of department chairperson. Leading of small voluntary groups affiliated with one of the department's regular courses. May be repeated for credit. (P/NP grading only.) —F, W, S. (F, W, S.)

#### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

#### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)

#### **Graduate**

#### **200. Methods and Materials in Theatre Research (4)**

Seminar—3 hours; term paper. Essential research tools in theatre and related fields; bibliographies, primary sources; methods of evaluating and presenting evidence; delineating research areas in the field.

#### **211. Advanced Voice and Speech (3)**

Lecture/discussion—2 hours; laboratory—2 hours. Prerequisite: consent of instructor. Open only to Dramatic Arts Students and Ph.D. students with an emphasis in Performance and Theatre. Review a progression of exercises to free, develop and strengthen the voice, first as a human instrument, and then as an actor's instrument using various texts such as Shakespeare, Ibsen and contemporary plays. Required for the M.F.A. degree in Acting. May be repeated two times for credit.

#### **212. Advanced Stage Movement (3)**

Laboratory—6 hours. Prerequisite: consent of instructor; graduate standing in the MFA program. Open to advanced undergraduates by consent of instructor. Application of modes of exploration, breath placement, and the use of imagery as well as Laban's effort/shape system as a method of analysis in classic and modern plays. May be repeated for credit.

#### **221. Special Problems in Advanced Acting (4)**

Seminar—2 hours; laboratory—4 hours. Prerequisite: consent of instructor. Advanced acting problems arising from differences in the type and style of plays selected from Greece to the present. May be repeated for credit.

#### **224A. Seminar in Theatrical Design: Ancient Worlds—Early 17th Century (4)**

Seminar—2 hours; project—2 hours. Prerequisite: consent of instructor. Group study while focusing primarily on one discipline: scenic, costume or lighting design. Periods covered: Greek, Medieval, Renaissance, Shakespearean, Jacobean, early 17th century. Design projects include script analysis, research of period style, fashion, character development, developing design concepts, presentation skills.

#### **224B. Seminar in Theatrical Design: Mid 17th Century to 1900 (4)**

Seminar—2 hours; project—2 hours. Prerequisite: consent of instructor. Group study focusing primarily on one discipline: scenic, costume or lighting design. Periods covered: Cavalier, Restoration 17th century opera and ballet, 19th century drama. Design projects include script analysis, research of period style, fashion, character development, developing design concepts, presentation skills.

#### **224C. Seminar in Theatrical Design: the 20th Century (4)**

Seminar—2 hours; project—2 hours. Prerequisite: consent of instructor. Group study focusing primarily on one discipline—scenic, costume or lighting design.

20th century genres covered: Realism, Brecht, Musicals, Contemporary Dance, short narrative film. Design projects include script analysis, research of period style, fashion, character development, developing design concepts, presentation skills.

#### **224D. Seminar in Theatrical Design: Contemporary Concepts (4)**

Seminar—2 hours; project—2 hours. Prerequisite: consent of instructor. Group study focusing primarily on one discipline: scenic, costume or lighting design. Emphasis on contemporary design concepts for new works and classics: Shakespeare, modern dance, concept plays and musicals. Script and character analysis for design in performance, research, design projects.

#### **224E. Seminar in Theatrical Design: Advanced Concepts (4)**

Seminar—2 hours; project—2 hours. Prerequisite: consent of instructor. Group study focusing primarily on one discipline: scenic, costume or lighting design. Emphasis on special issues in contemporary design concepts for new works and classics. Script and character analysis for design in performance, research, design projects.

#### **225. Performance Design Studio: Techniques and Media (2)**

Studio—2 hours. Prerequisite: consent of instructor. Exploration and development of techniques and skills in the performance design process. Drafting, model building, drawing, painting and rendering, costume drawing, color theory, lighting techniques, design portfolio preparation and presentation. May be repeated up to five times for credit.

#### **228. Seminar in Directing Theory: Non-Realism (4)**

Seminar—3 hours; term paper. Prerequisite: consent of instructor. Modern directing theory as it applies to non-realistic theatre; development of directorial concepts for production of selected non-realistic plays—Greek to the present; emphasis on textual analysis.

#### **229. Special Problems in Directing (4)**

Seminar—2 hours; laboratory—2 hours; rehearsal—4 hours. Prerequisite: consent of instructor. Projects in directing scenes selected from plays from ancient Greece to the present. May be repeated two times for credit.

#### **230. Advanced Problems in Choreography and Performance (2)**

Laboratory/discussion—2 hours. Prerequisite: consent of instructor. Explores contemporary issues of choreography and performance in depth and how those issues pertain to performance work. Focus will include contemporary thought on representation, legibility, new forms, and cultural attitudes. May be repeated six times for credit.

#### **244. Critical Approaches to Traditional Systems of Body Movement (4)**

Discussion/laboratory—6 hours; project; term paper. Prerequisite: consent of instructor. Introduction to traditional systems for body movement, development of critical approaches to them, and experiments in how they inform training and practice in theatre, dance, and performance. May be repeated five times for credit. Offered irregularly.

#### **250. Modern Theatre (4)**

Seminar—3 hours; term paper. Prerequisite: consent of instructor. The theatre of Europe and America, 1860-1940, with emphasis on the relationship of the dramas of the period to the physical circumstances under which they were produced.

#### **251. Scoring and Scripting in Performance (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: consent of instructor. Process of weaving together various performance elements brought into play by the artists in their respective disciplines. The "script" is the thread from which the artists' "scores" will layer and transform the "script" into performance for specific time, place, spectators. Offered in alternate years.

**252. Performance: Concepts of Space, Place, and Time (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: consent of instructor. Innovative theories of creating performance spaces, establishing a sense of place, and communicating the concept of time explored through collaborative interaction. Research includes traditional principles, site-specific spaces and consideration of various tempi from music and movement. Offered in alternate years.

**253. Approaches to Collaboration (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: consent of instructor. Exploration of different approaches to collaboration among artists in different media and their influence on the creative process.

**254. Performing Identities/Personae (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: consent of instructor. Historical and contemporary theories of constructing stage identities. Discussion and project collaborations based on theories. Questions of identity related to ethnicity, gender or sexual orientation. Offered in alternate years.—S. (S.)

**255. Composition in the Arts (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: consent of instructor. Examine manner in which specific elements utilized by actors, dancers, directors, choreographers, and designers are combined or related to form a whole in space and time, as well as methods of sequencing used by each discipline to produce artistic products. May be repeated one time for credit.

**256. Visual Language for Performance (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: graduate standing. Restricted to graduate students. Exploration of different approaches and methods to the visual elements of performance. Focus on design and style for different media and genres, storytelling through visual elements of performance. Offered in alternate years.—Morgan

**257. Interdisciplinary Seminar in Theatre, Dance and Performance (1)**

Seminar—1.5 hours; project—1.5 hours. Prerequisite: consent of instructor. Restricted to students enrolled in the MFA in Dramatic Art; students taking the PhD in Performance Studies or the DE in Studies in Performance and Practice may apply to enroll. Interdisciplinary seminar for first and second year MFA students in Dramatic Art. Topics range from current practice in dance, theatre, film and performance, to leading edge developments by outstanding practitioners in the field. May be repeated two times for credit.

**259. Topics in Contemporary Theatre and Performance (4)**

Seminar—3 hours; term paper. Prerequisite: consent of instructor. Special topics designed to study in depth aspects of contemporary performance including performance analysis, cultural and historical context, modes of production, theoretical and political entailments, and issues of spectatorship (e.g., "Brecht and After," "British Theater," "Race and Gender in Performance.") May be repeated five times for credit.—F, W, S. (F, W, S.)

**260. Topics in Contemporary Theatre and Performance (4)**

Seminar—3 hours; term paper; project. Prerequisite: admission to any graduate program in the University; consent of instructor. Preference to students enrolled in the Designated Emphasis in Studies in Performance and Practice. Instruction is offered a variety of disciplinary approaches and methodologies in Performance and Practice, with a focus is on cross-disciplinary learning and research. Usually offered each quarter. Maybe repeated for credit when content differs. Offered irregularly.

**265A. Performance Studies: Modes of Production (4)**

Seminar—3 hours; term paper; project. Prerequisite: consent of instructor. Introduces students to the literature of performance production in a variety of media: theatre, dance, film, video, computer-based,

looking at cultural, aesthetic, rhetorical and political theory. May be repeated three times for credit when topic differs. Offered in alternate years.

**265B. Performance Studies: Signification and the Body (4)**

Seminar—3 hours; term paper; project. Prerequisite: consent of instructor. Introduces students to analysis of the body in performance, drawing on theoretical models from several fields. May be repeated three times for credit when topic differs. Offered in alternate years.

**265C. Performance Studies: Performance and Society (4)**

Seminar—3 hours; term paper; project. Prerequisite: consent of instructor. Introduces students to the role of performance (broadly defined), in everyday life, sociopolitical negotiation, identity, social movements, the media, and the state. May be repeated three times for credit when topic differs. Offered in alternate years.—W, S. (W, S.)

**265D. Performance Studies: Theory, History, Criticism (4)**

Seminar—3 hours; term paper; project. Prerequisite: consent of instructor. Introduction to the theory, history and criticism, informing performance studies. May be repeated three times for credit when topic differs. Offered in alternate years.

**280. Theatre Laboratory (1-12)**

Prerequisite: consent of instructor. Advanced practice in acting, designing, directing, playwriting, and technical theatre. May be repeated for credit.

**298. Group Study (1-5)**

Prerequisite: consent of instructor.

**299. Individual Study (1-12)**

Prerequisite: consent of instructor. (S/U grading only.)

**299D. Dissertation Research (1-12)**

Prerequisite: consent of instructor. (S/U grading only.)

**Professional****396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: consent of instructor. May be repeated for credit. (S/U grading only.)

**Professional****413. Stage Make-up (1)**

Lecture/laboratory—2 hours. Prerequisite: consent of instructor. Approved for graduate degree credit. Lectures, demonstrations, and practical work in aspects of theatrical make-up.

## Transportation Technology and Policy (A Graduate Group)

Susan Handy, Ph.D., Chairperson of the Group

**Group Office.** 1605 Tilia, Suite 100  
530-752-0247; <http://www.its.ucdavis.edu>

**Faculty**

Gwen Arnold, Ph.D., Assistant Professor  
(Environmental Science and Policy)

Francis Assadian, Ph.D., Professor  
(Mechanical and Aerospace Engineering)

David Bunch, Ph.D., Professor  
(Graduate School of Management)

Paul Erickson, Ph.D., Associate Professor  
(Mechanical and Aerospace Engineering)

Yueyue Fan, Ph.D., Associate Professor  
(Civil and Environmental Engineering)

Y. Hosseini Farzin, Ph.D., Professor  
(Agricultural and Resource Economics)

Susan Handy, Ph.D., Professor  
(Environmental Science and Policy)

John T. Harvey, Ph.D., Professor  
(Civil and Environmental Engineering)

Miguel Jaller, Ph.D., Assistant Professor  
(Civil and Environmental Engineering)

Bryan Jenkins, Ph.D., Professor  
(Biological and Agricultural Engineering)

Alissa Kendall, Ph.D., Associate Professor  
(Civil and Environmental Engineering)

Cynthia Lin Lawell, Ph.D., Associate Professor  
(Agricultural and Resources Economics)

Frank Loge, Ph.D., Professor  
(Civil and Environmental Engineering)

Mark Lubell, Ph.D., Professor  
(Environmental Science and Policy)

Erich Muehlegger, Assistant Professor  
(Economics)

Debbie A. Niemeier, Ph.D., Professor  
(Civil and Environmental Engineering)

Joan Ogden, Ph.D., Professor  
(Environmental Science and Policy)

David Rapson, Ph.D., Assistant Professor  
(Economics)

Simon Sadler, Ph.D., Professor (Design)

Daniel Sperling, Ph.D., Professor (Civil and Environmental Engineering, Environmental Science and Policy)

Stephen M. Wheeler, Ph.D., Associate Professor  
(Landscape Architecture)

Michael Zhang, Ph.D., Professor  
(Civil and Environmental Engineering)

**Emeriti Faculty**

Thomas Cahill, Ph.D., Professor Emeritus  
(Atmospheric Science and Physics)

Dan Chang, Ph.D., Professor Emeritus  
(Civil and Environmental Engineering)

Harry Dwyer, Ph.D., Professor Emeritus  
(Mechanical and Aerospace Engineering)

Mark Francis, M.L.A., Professor  
(Landscape Architecture)

Andrew A. Frank, Ph.D., Professor Emeritus  
(Mechanical and Aerospace Engineering)

Robert Johnston, Ph.D., Professor Emeritus  
(Environmental Science and Policy)

Patricia L. Mokhtarian, Ph.D., Professor Emeritus  
(Civil and Environmental Engineering)

**Affiliated Faculty**

Rahman Azari, Ph.D., Lecturer (Statistics)

Andrew F. Burke, Ph.D., Research Engineer  
(Institute of Transportation Studies)

Steven S. Cliff, Ph.D., Research Engineer  
(Applied Science)

Kenneth S. Kurani, Ph.D., Research Engineer  
(Institute of Transportation Studies)

Alan Meier, Ph.D., Professional Researcher  
(Institute of Transportation Studies)

Gian-Claudia Sciarra, Ph.D., Assistant Professional Researcher (Institute of Transportation Studies)

Gil Tal, Ph.D., Assistant Professional Researcher  
(Institute of Transportation Studies)

Thomas Turrentine, Ph.D., Research Anthropologist  
(Institute of Transportation Studies)

Christopher Yang, Ph.D., Research Scientist  
(Institute of Transportation Studies)

Sonia Yeh, Ph.D., Research Scientist  
(Institute of Transportation Studies)

**Graduate Study.** The Graduate Group in Transportation Technology and Policy offers the M.S. (Plan I—thesis; and Plan II—exam), and Ph.D. degrees in two areas of specialization: Transportation Technology; and Transportation Planning and Policy. The technology track is for students trained in engineering and the physical sciences and interested in systems-level planning, analysis, management and design of advanced technologies (emphasizing vehicle propulsion and "intelligent transportation system" technologies) focusing on energy and environmental issues. The planning and policy track is aimed at students from a wider range of disciplines interested in the broader public policy issues concerning transportation systems. The curriculum for both tracks includes courses in civil, mechanical, and environmental engineering, economics, policy sciences, statistics, travel behavior, management, technology assessment and environmental studies.

**Preparation.** Applicants will normally be expected to have completed two courses in calculus, one course in linear algebra, and one course each in calculus level statistics and microeconomics. Additionally, students entering the technology track will need either to have an appropriate technical background or make up a relatively large number of prerequisite courses in order to be able to take the approved courses in that track.

**Program of Study.** Students will have the option of following either a technology or policy/management track. M.S. students complete 6 core courses plus electives. Ph.D. students take 7 courses from the same core, 3 additional courses from their chosen track, one more in the alternate track, plus electives. Master's degrees require a minimum of 36 quarter units and doctoral degrees require a minimum of 54 units. M.S. Plan I students may replace up to 6 units of regular course work with research (course 299) units. At least two thirds of all credits must be at the graduate level.

**Graduate Advisers.** YueYue Fan and Alissa Kendall

## Curriculum

**Core Courses.** Students in each track are required to take courses in a common set of core competencies, as well as (for Ph.D. students) some courses in the other track.

**Knowledge areas core courses:** M.S. and Ph.D. students take Transportation Technology (TP 210), Transportation Policy (ECI 252 or TTP 220), and Transportation Systems (ECI 251).

**Skill areas core courses:** M.S. and Ph.D. students take one in the area of Research Design from the following: Transportation Survey Methods (TPP 200), Research Methods in Environmental Policy (ESP 278), Survey and Questionnaire Research Methods (PSY 207), Design and Analysis of Engineering Experiments (EBS 265), Experimental Design and Analysis (PLS 205), Engineering Experimentation and Uncertainty Analysis (MAE 207), or Statistical Methods for Research (STA 205);

M.S. students take one and Ph.D. students take two in the area of Transportation Models and Quantitative Methods from the following: Applied Linear Programming (ARE 252), Optimization Techniques with Economic Applications (ARE 253), Dynamic Optimization Techniques with Economic Applications (ARE 254), Applied Econometrics (ARE 256), Probabilistic Design and Optimization (ECI 249), Dynamic Programming and Multistage Decision Processes (ECI 253), Discrete Choice Analysis of Travel Demand (ECI 254), Urban Traffic Management and Control (ECI 256), Transportation-Air Quality: Theory and Practice (ECI 269), Quantitative Geography (GEO 200CN), Numerical Optimization (MAT 258A), Variational Analysis (MAT 258B), Applied Statistical Methods: Regression Analysis (STA 108), Applied Statistical Methods: Analysis of Variance (STA 106), Analysis of Categorical Data (STA 138), Design and Analysis of Engineering Experiments (EBS 265), Multivariate Systems and Modeling (PLS 206), or Psychological Data (PSC 204A, B, C, or D);

**Integration and Breadth core courses:** M.S. and Ph.D. students take ITS Seminars (TPP 281), Transportation Orientation Seminar (TPP 282), and Research (TPP 299).

**Planning and Policy Courses.** Approved courses in this area include the following; additional courses may be added upon approval by the Chairperson:

Agricultural and Resource Economics, 100B, 130, 136, 144, 175, 176, 204, 275, 276  
 Anthropology 104N, 127, 211, 222  
 Civil and Environmental Engineering, 165, 244A, 252, 258, 268, 269  
 Civil and Environmental Engineering/  
 Environmental Science and Policy 163, 289A  
 Communication 170  
 Community and Regional Development 162, 171, 240, 245  
 Ecology 213  
 Economics 101, 200D  
 Education 222  
 Engineering 250  
 Environmental Horticulture 110  
 Environmental Science and Policy 163, 167, 168A, 171, 179 212A  
 Geography 155  
 History 172  
 Landscape Architecture 180G, 180L, 180M, 181M, 201, 205, 220  
 Management 240, 251, 293  
 Political Science 175, 187, 208, 279  
 Psychology 155  
 Sociology 141, 143A, 143B, 160  
 Transportation Technology and Policy 200, 210, 220, 281, 282, 289A

**Technology Courses.** Approved courses in this area include the following; additional courses may be added upon approval by the Chairperson:

Applied Biological Systems Technology 180, 181N, 182  
 Atmospheric Science 116, 270  
 Applied Science Engineering 116, 220A, 220B  
 Biological Systems Engineering 216  
 Civil and Environmental Engineering 143, 149, 161, 162, 179, 242, 244, 250, 253, 256, 257, 269, 282  
 Computer Science Engineering 168  
 Environmental and Resource Sciences 131, 186  
 Electrical and Computer Engineering 207  
 Geography, 200CN  
 Landscape Architecture 150  
 Mechanical Engineering 134, 161, 163, 188, 216, 217, 218, 226, 234, 236, 258, 269

**Other Courses.** Approved courses in this area include the following; additional courses may be added upon approval by the Chairperson:

Agricultural and Resource Economics 106, 155, 252, 253, 254, 255, 256  
 Anthropology 138  
 Biological Systems Engineering 265  
 Civil and Environmental Engineering 153, 249, 254  
 Community and Regional Development 151, 151L  
 Economics 140, 240A, 240B, 240C, 256  
 Engineering, Applied Science 115  
 Engineering, Biological Sciences 265  
 Environmental Science and Policy 278  
 Graduate School of Management 249  
 Mathematics 108, 227, 258A, 258B  
 Mechanical and Aeronautical Engineering 207  
 Nutrition 492A  
 Plant Sciences 205, 206  
 Psychology 204A, 204B, 204C, 204D, 205A, 205B, 205C  
 Sociology 298  
 Statistics 106, 108, 130, 131A, 131B, 131C, 135, 137, 138, 140, 142, 144, 205, 222, 223  
 Transportation Technology and Policy 200

## Courses in Transportation Technology and Policy (TTP)

### Graduate

#### 200. Transportation Survey Methods (4)

Lecture—4 hours. Prerequisite: Statistics 13; Civil and Environmental Engineering 251 recommended. Description of types of surveys commonly used in transportation demand modeling, including travel and activity diaries, attitudinal, panel, computer, and stated-response surveys. Discussion of sampling, experimental design, and survey design issues. Analysis methods, including factor, discriminant and cluster analysis. Not open for credit to students who have taken Civil and Environmental Engineering 255. (Same course as Geography 281.)—W. (W.)

#### 210. Fundamentals of Transportation Technology (4)

Lecture—2 hours; discussion—2 hours. Prerequisite: consent of instructor; Mathematics 21A, 21B, 22A; graduate or junior/senior undergraduate as a technical elective. Limited enrollment. Fundamentals of Transportation Technology is a course designed to prepare students in the basics of thermodynamics, fluid mechanics and heat transfer as they relate to transportation. Not open for credit to students who have completed course 289. (Former course 289.)—F. (F.)

#### 220. Transportation Planning and Policy (4)

Lecture/discussion—4 hours. Limited enrollment. Transportation planning process at the regional level, including the role of federal policy in shaping regional transportation planning, tools and techniques used in regional transportation planning, issues facing regional transportation planning agencies, pros and cons of potential solutions and strategies. Students having taken this course previously as course 289 cannot repeat it for credit; having taken other course 289 offerings does not preclude taking this course for credit. (Same course as Geography 236.) Offered in alternate years.—S. Handy

#### 281. ITS Transportation Seminar Series (1)

Seminar—1.5 hours. Transportation seminars by guest speakers, on varied topics. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.) Handy, Sperling

#### 282. Transportation Orientation Seminar (1)

Seminar—1 hour. Ten weeks of seminars, introducing various topics in transportation research and education, focusing on topics of particular interest at UC Davis. May be repeated for credit. (S/U grading only.)—F. (F.) Handy

#### 283. Professionalism, Leadership, and Ethics (1)

Seminar—2 hours. Speakers from industry, government, academia, and NGOs will lead discussions about succeeding and performing in the professional world. They will address leadership, ethics, and other workplace issues. May be repeated for credit. (S/U grading only.)—S. (S.) Sperling

#### 289A. Selected Topics in Transportation Technology and Policy (1-5)

Lecture and/or laboratory. Prerequisite: consent of instructor. Directed group study of special topics with instruction carried out through lecture or laboratory, or a combination of both. May be repeated for credit. —F, W, S. (F, W, S.)

#### 289B. Selected Topics in Transportation Technology and Policy (1-5)

Lecture and/or laboratory. Prerequisite: consent of instructor. Directed group study of special topics with instruction carried out lecture or laboratory, or a combination of both. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

#### 290C. Graduate Research Group Conference (1)

Discussion—1 hour. Prerequisite: consent of instructor. Research problems, progress, and techniques in transportation. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## **292. Internship in Transportation Technology and Policy (1-5)**

Prerequisite: second year standing; approval of project prior to period of internship. Supervised work experience in transportation studies. May be repeated for credit if topic differs. (S/U grading only.)—F, W, S. (F, W, S.)

## **298. Group Study (1-5)**

Discussion—1-5 hours. Prerequisite: consent of instructor. (S/U grading only.)

## **299. Research (1-12)**

Discussion—1-12 hours. Prerequisite: consent of instructor. (S/U grading only.)

## **Professional**

### **396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## **UC Davis Study Abroad**

Aliki Dragona, Ph.D., Fadi Fathallah, Ph.D., Faculty Directors

UC Davis Study Abroad  
International Center, Suite 1120  
530-297-4633; Fax 530-297-4695;  
[studyabroad@ucdavis.edu](mailto:studyabroad@ucdavis.edu);  
<http://studyabroad.ucdavis.edu/>

The opportunity to study abroad is one of the richest educational experiences a student can have. When students return from study abroad in places like Italy or Hong Kong, they describe their time abroad as an experience that changed their lives. Students study abroad to pursue their academic interests in a global context, to learn a language, to gain practical field work, internship or lab experience, to prepare for a job in the global economy and to add distinction to an application for graduate or professional school.

UC Davis Study Abroad can help students decide which program is best for them, whether to study abroad for a summer, quarter, semester or full year and when to go abroad (freshman through senior years). UC Davis Study Abroad Coordinators also participate in freshman seminars, offer financial aid workshops and can advise on programs that have internship opportunities. UC Davis Study Abroad also administers the Global and International Studies (GIS) minor, which is sponsored by the Humanities Program in the College of Letters and Science.

UC Davis Study Abroad is home to UC Davis Quarter Abroad, UC Davis Summer Abroad, UC Davis Internships Abroad, UC Davis Seminars Abroad and the University of California Education Abroad Program (UCEAP). UC Davis Study Abroad also provides advising for students interested in non-UC “independent” programs and administers the Non-UC Study Abroad leave program. Finally, UC Davis Study Abroad advises and provides student services for international UCEAP Reciprocity students.

## **UC Education Abroad Program (UCEAP)**

Fadi Fathallah, Ph.D., Faculty Director  
UC Davis Study Abroad  
International Center, Suite 1120  
530-297-4633; Fax 530-297-4695;  
<http://studyabroad.ucdavis.edu/programs/uceap/>

The UC Education Abroad Program (UCEAP) is one of the premiere study abroad programs in the nation. UCEAP offers international study programs in association with nearly 140 host universities and institutions in some 32 countries around the world. Participating students remain registered at UC while studying abroad and receive full academic credit for their work. UCEAP students maintain their financial aid and scholarship eligibility while abroad. UCEAP has study abroad opportunities for undergraduates

at all class levels as well as for qualified graduate students who have completed at least one full year of graduate work and have the support of their graduate program and graduate dean.

UCEAP offers year, semester, quarter, and summer programs for all majors. Over 50% of the programs are offered in English, while several programs allow students to learn a language while experiencing the culture first hand. Some programs include the possibility of internships or field research. In most cases, students attend courses taught by the faculty of the host institution.

UC faculty members serve as directors at most Study Centers abroad, providing in-country academic advising to students during their program. Full UC credit is granted for courses satisfactorily completed, and courses and grades are recorded on official UC transcripts. With careful planning, most UCEAP students make normal progress toward their UC degrees, even those students who study abroad for a full year. With approval of their major or college advisers, students may earn credit towards their major, minor and general education requirements.

**Graduation Requirements.** II prospective applicants, particularly students who intend to study abroad during their senior year, should carefully plan their course programs for Davis and abroad in order to satisfy university, college, and major/minor requirements for their degree.

Although units and grade points earned while studying abroad through UCEAP are incorporated into the University transcript and GPA, departments and majors retain the right to determine which UCEAP courses will be accepted in satisfaction of major and minor requirements.

All degree candidates must meet the University residence requirement. Recognizing the special value of study abroad, the faculty have approved two exceptions to the usual residence requirement for students participating in the Education Abroad Program:

- Students planning to graduate immediately upon completion of their UCEAP program may satisfy the University residence requirement by completing at least 35 of their final 45 units on the Davis campus preceding entry into the EAP,

**or**

- Students who have not finished all of their degree requirements following completion of their UCEAP program may satisfy the University residence requirement by completing at least 35 units, including at least 12 units after returning from UCEAP, on the Davis campus within the final 90 units earned toward the degree. With this option, as many as 55 units taken abroad may be applied toward the unit requirement for graduation.

Students should consult with their college Dean's office early during the UCEAP planning process for information on the university residence requirement. Students may satisfy GE requirements while on UCEAP, but should consult with the Education Abroad Center UC Davis Study Abroad and their college Dean's office prior to departure for information on the certification process.

Students may participate in UCEAP provided that (1) they will not exceed 225 units prior to their departure and (2) that all their degree requirements have been fulfilled either before they leave campus or during their time on UCEAP study abroad program. Participants may only return to campus from UCEAP to complete any outstanding degree requirements provided that they can do so within 225 units.

Participants in programs that conclude in May or June who satisfy all degree requirements while abroad and expect to graduate upon completion of the year abroad should file for candidacy to receive their degree in September; candidacy filing dates are established by the Office of the University Registrar. In most cases, transcripts from abroad may not be received in time to be posted on the student's Davis transcript for UCEAP returnees to be included

on the June degree list. Such returning students may register to participate in the June commencement ceremony; however, their graduation date will be in September. Participants in programs that conclude in November or December should file for candidacy to receive their degree in March. Such returning students may be able to register to participate in either the December or subsequent June commencement ceremony. Their graduation date will be in March.

## **UC Davis Faculty-Led Programs Abroad**

Aliki Dragona, Ph.D., Faculty Director  
UC Davis Study Abroad  
International Center, Suite 1120  
530-297-4633; Fax 530-297-4695;  
<http://studyabroad.ucdavis.edu/>

UC Davis Study Abroad offers a number of faculty-led programs abroad, including UC Davis Quarter Abroad, UC Davis Summer Abroad, UC Davis Internships Abroad, and UC Davis Seminars Abroad. These programs enable students to study abroad in small program cohorts taught by UC Davis faculty in over 30 countries around the world. Programs are specifically tailored to UC Davis disciplines and provide unique opportunities for study, internships, field or lab work, research, and language learning in intimate and engaging environments.

Participants remain registered UC Davis students while abroad and receive UC Davis units for their academic work. Open to students from any major, these programs allow students to choose courses from a wide range of specializations.

Programs range from two-week seminars to four-week summer offerings to quarter-long options. All programs allow students to experience the host country's unique culture through co-curricular activities, such as day-trips to surrounding areas, museum tours, and theatre visits. Many also include field work, internship, or service learning opportunities.

Financial aid and scholarships apply. Students may participate in UC Davis faculty-led programs as early as their freshman year, or as late as their senior year. Applicants must have a 2.000 GPA, be in good academic and disciplinary standing, and must fulfill any prerequisites specific to the program courses.

In preparation for UC Davis Quarter Abroad, UC Davis Summer Abroad, and/or UC Davis Seminars Abroad, students are urged to take Education Abroad Program (EAP) 90X or 190X.

## **UC Davis Quarter Abroad**

Aliki Dragona, Ph.D., Faculty Director  
International Center, Suite 1120  
530-297-4633; Fax 530-297-4695;  
[quarterabroad@ucdavis.edu](mailto:quarterabroad@ucdavis.edu);  
<http://quarterabroad.ucdavis.edu/>

**Academic Focus.** Students can earn 12-28 UC Davis quarter units through 3-6 courses taught abroad. Academic focus varies by program and may include subject area courses, language learning, lab work, internship/field work, and/or practical training experience. Programs range in length from 10 to 16 weeks. UC Davis faculty leaders teach one or more of the courses of the program, while other courses may be taught or co-taught by adjunct faculty of the host country, under supervision by UC Davis faculty. Students may be able to apply earned units towards their major, minor, language, or general education requirements.

## **UC Davis Summer Abroad**

Aliki Dragona, Ph.D., Faculty Director  
International Center, Suite 1120  
530-757-8308; Fax 530-297-7142;  
[summer-abroad@ucdavis.edu](mailto:summer-abroad@ucdavis.edu);  
<http://summer-abroad.ucdavis.edu>

**Academic Focus.** Students earn 8 UC Davis quarter units through two courses taught abroad. All courses are taught by UC Davis faculty, sometimes with select supplemental lectures provided by local

experts. Planned group activities and field trips enhance classroom instruction. Students may be able to apply earned units towards their major, minor, or general education requirements. Programs allow students to complete coursework in English in a wide variety of non-English-speaking locations.

### **UC Davis Internships Abroad**

Aliki Dragona, Ph.D., Faculty Director  
International Center, Suite 1120  
530-757-8308; Fax 530-297-7142;  
<http://studyabroad.ucdavis.edu/>

**Academic Focus.** Students earn 6 or more UC Davis units for internship hours and supplemental instruction. Internship programs are structured around thematic areas of study such as Global Health, Engineering, Business and Communication. Placements are a collaboration between international organizations, UC Davis Study Abroad and the UC Davis Internship and Career Center to ensure the internships meet requirements for credit and relevance to the subject area. In addition to internship hours worked, students will take an online course taught by UC Davis faculty that places their internship in a broader social and cultural context. Planned group activities and field trips enhance the formal internship work. Students may be able to apply earned units towards their major, minor, or general education requirements. Most placements are in English-speaking environments; some programs require language proficiency.

### **UC Davis Seminars Abroad**

Aliki Dragona, Ph.D., Faculty Director  
International Center, Suite 1120  
530-297-4633; Fax 530-297-4695;  
<http://studyabroad.ucdavis.edu/>

**Academic Focus.** Students earn 2-6 UC Davis quarter units through one or more courses taught abroad. These short courses are taught by UC Davis faculty and may be offered as stand-alone programs abroad, or as an international component to a course taught during a regular term on campus. A heavy focus on field trips, onsite projects and group activities enhance classroom instruction. Students may be able to apply earned units toward their major, minor, or general education requirements. Programs are typically offered in September, June, or during the winter break.

### **Courses in Education Abroad Program (EAP)**

#### **Lower Division**

##### **90X. International Education Seminar (1)**

Seminar—1 hour. Prerequisite: open to lower division applicants for EAP or UC Davis study abroad and international internship programs. Seminar examines the academic, cultural, and personal issues of study abroad, including academic programs abroad, country-specific history and culture, cross-cultural experiences, culture shock, racial and gender issues. May be repeated for credit. (P/NP grading only.)—F, S. (F, S.)

#### **Upper Division**

##### **180. Education Abroad: Special Topics (1-12)**

Lecture/discussion—3-12 hours; laboratory/discussion—3 hours. Prerequisite: minimum GPA requirement for each study abroad program as specified in the written agreement between UC Davis and the host institution; prerequisites for language courses may also apply. Students who participate in approved international programs take this course up to 12 units while studying abroad. May be repeated for credit; credits will be reviewed by departments and Dean's Office to determine how they fulfill UC Davis requirements. Offered irregularly.—F, W, S, Su. (F, W, S, Su.)

##### **190X. International Education Seminar (1)**

Seminar—1 hour. Prerequisite: open to upper division applicants for EAP or UC Davis study abroad and international internship programs. Seminar

examines the academic, cultural, and personal issues of study abroad, including academic programs abroad, country-specific history and culture, cross-cultural experiences, culture shock, racial and gender issues. May be repeated for credit. (P/NP grading only.)—F, S. (F, S.)

##### **192. Internship in Education Abroad (1-4)**

Internship—3-12 hours. Prerequisite: participation in a study abroad program. Internship related to education abroad. May take place at or away from the university. May be repeated for up to 12 units of credit. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

## **UC Washington Center (UCDC)**

**Campus Program Office.** The Grove (Surge III), Room 1350; 530-752-6652;  
<http://washingtonprogram.ucdavis.edu>

**Residential Program Location.** 1608 Rhode Island Avenue, NW, Washington, D.C. 20036

The University of California hosts a system-wide academic and residential program for undergraduate students attending from each of the UC campuses. Housed within the UC Washington Center (UCDC), an 11-story, state of the art facility, convenient to public transportation and located in downtown D.C., the programs provide undergraduates opportunity to enrich their education while in residence for one quarter in the nation's capital. The program's principal activities include enrollment in credit-bearing courses, participation in academic internships, and opportunity to explore the many educational, cultural and historical activities in the Washington area.

#### **Program of Study**

UCDC is open to undergraduates from all majors who will have upper-division standing by the start of the quarter in which they plan to participate although not required. A GPA of at least 3.000 is recommended for admission although not required. Applicants are also evaluated based on overall relevant employment, internship, and volunteer experiences, written statement, and letter(s) of recommendation (only one is required).

**Academic Year Component (11 weeks).** Students earn academic credit and continue to be registered as full-time UC Davis students during the quarter in which they participate.

• **Internship (Mandatory).** Students work from 3-4 days per week as interns in think-tanks, museums, Congress, federal agencies, interest groups, trade associations, research institutions, media corporations, or in other organizations related to the interests and objectives of individual students.

• **Research Seminar (Mandatory).** Each student writes a research paper in consultation with Washington Program faculty and graduate fellows. To complete the assignment, students take advantage of the many unique research resources in Washington, DC.

• **Elective Seminar Course (Optional).** Each student may optionally enroll in one elective upper division seminar course taught at UCDC. These courses vary each quarter from among offerings that typically include international relations, history, political science, public policy and other social sciences; the arts and humanities; and science policy. In addition to regular instruction, seminars often include guest speakers, observations of congressional committees and federal agencies, and other relevant Washington experiences.

Courses are taught by UCDC faculty appointed by the various UC campuses, or visiting faculty from the Washington area.

Financial aid eligibility and awards as determined by the home campus is maintained while enrolled in

the program, and the aid package can be adjusted to reflect the additional costs of the program.

**Summer Component (10 weeks).** UCDC also offers a 10-week Summer Program with a credit or non-credit option. The credit option allows students to enroll in courses in addition to working at an internship. Students pay the summer sessions rate per credit hour plus an application fee. The non-credit option (internship only) has no enrollment fee. Both options allow students to participate in many educational, cultural, historical and social activities.

#### **University Graduation Requirements**

- All prospective applicants should carefully plan their course programs in order to satisfy university, college, and major/minor requirements for their degree.
- Although units and grade points earned at UCDC are incorporated into the University transcript and GPA calculation, departments and programs retain the right to determine which UCDC courses will be accepted in satisfaction of major and minor requirements.
- All degree candidates must meet the University residence requirement. Students should consult with their college Dean's office early during the UCDC planning process for information on the university residence requirement, particularly students who intend to study abroad or participate in UCDC during their senior year.

Recognizing the special value of UCDC, the faculty has approved two exceptions to the usual residence requirement for students participating in the Washington Program:

- Students planning to graduate immediately upon completion of participation in UCDC may satisfy the University residence requirement by completing at least 35 of their final 45 units on the Davis campus immediately preceding entry into UCDC.
- Students who have not finished all of their degree requirements following completion of their participation in the UCDC program may satisfy the University residence requirement by completing at least 35 units, including at least 12 units after returning from UCDC, on the Davis campus within the final 90 units earned toward the degree.

Students who will not meet the residency requirements outlined may petition their Dean's office requesting an exception to policy.

- Students may satisfy GE requirements while at UCDC but should consult with their college Dean's office prior to departure for information on the certification process.
- Students with a large number of units may participate in the UCDC program provided that (1) they will not exceed 225 units prior to their departure and (2) that all their degree requirements have been fulfilled either before they leave campus or during their time at UCDC. Participants may only return to campus from UCDC to complete any outstanding degree requirements provided that they can do so within the 225 unit restriction.

### **Courses in UC Washington Center (WAS)**

Optional elective courses listed at <http://www.ucdc.edu/academic/courses>.

#### **Upper Division**

##### **175. Health Policy and Health Politics (4)**

Seminar—3 hours; extensive writing or discussion—1 hour. Restricted to students attending UC Washington Center program. Following the model of a Congressional subcommittee, identification of four salient health policy issues for study, research, and development of model policies to address them.

(Same course as Public Health Sciences 175W.) GE credit: SocSci, Wrt | ACGH, OL, SS, WE.

**187. Gun Violence (4)**

Lecture/discussion—4 hours. Restricted to students attending UC Washington Center program. Gun violence, viewed from the perspectives of criminology and public health. Topics include personal and societal contributing factors and critical assessment of potential solutions. Offered in alternate years.

**192. Internship in the UC Davis Washington Program (8)**

Internship—32 hours. Prerequisite: junior or senior standing, admission in the UC Davis Washington Program, and course 193 concurrently. Internship in Washington, DC with associated, supervised research project. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

**193. Washington Center Research Seminar (4)**

Lecture/discussion—1 hour; independent study—3 hours; tutorial—0.5 hour. Prerequisite: course 192 concurrently. Core academic component of Washington Program. Topics coordinated with internships. Research draws on resources uniquely available in Washington, DC. Supervised preparation of extensive paper. (Same course as Political Science 193W.) GE credit: SocSci, Wrt | OL, SS, WE.—F, W, S, Su. (F, W, S, Su.)

## University Honors Program

David Furlow, Ph.D., Director

Eddy Ruiz, Ph.D., Associate Director

**Program Office.** 1350 The Grove (formerly Surge 3) 530-752-3225;  
<http://honors.ucdavis.edu/>

**Faculty**

Includes members from various departments across colleges.

**The Program of Study**

The honors course of study is designed to enhance the undergraduate experience of highly motivated students in all academic pathways. The University Honors Program (UHP) is an interdisciplinary, campus-wide honors program for top students interested in enhancing their education through special courses, close contact with faculty, and dynamic interaction with academic peers.

General Education Honors courses, seminars, and special study opportunities constitute the course offerings of the University Honors Program. First-year and second-year students in the UHP take six General Education honors courses during their first and second year. Upper division and transfer students complete a variety of research projects and service learning opportunities. All students who successfully complete the program receive transcript notation.

UHP courses and seminars are designed to foster critical thinking and analytic interpretation, improve oral, written and technical communication skills, enhance research skills, and provide experience with group dynamics and collaborative exploration of problems. Course enrollment is generally limited to 25 students.

Updated program information is available at the UHP website. A complete list of these courses, with course registration numbers, is made available to admitted students through the UHP office.

Only University Honors Program students may register for the courses in University Honors Program (HNR).

**Courses in Davis Honors Challenge (HNR)****Lower Division****90X. Honors Discussion Section (1)**

Discussion—1 hour. Prerequisite: open only to students in the Davis Honors Challenge. Examination of special topics in selected lower division courses through additional readings, discussions, term papers, collaborative work, or special activities, including projects, field and laboratory experiences, computer simulations, creative works. May be repeated for credit.

**92. Internship (1-12)**

Internship—3-36 hours. Prerequisite: open only to students in the Davis Honors Challenge. Supervised work experience under the auspices of the Davis Honors Challenge. May be repeated for credit for a total of 12 units. (P/NP grading only.)

**94. Honors Seminar (4)**

Seminar—4 hours. Open to students in the Davis Honors Challenge. Collaborative, multidisciplinary exploration of complex contemporary problem. Focus on critical thinking and analytical interpretation, on oral and written communication, and on the use of electronic media in gathering information. May be repeated for credit. GE credit: Wrt | WE.—F, W, S. (F, W, S.)

**98. Directed Group Study (1-5)**

Discussion—1-5 hours. Prerequisite: open only to students in the Davis Honors Challenge. May be repeated for credit. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5)**

Independent study—1-5 hours. Prerequisite: student in the Davis Honors Challenge. (P/NP grading only.)

**Upper Division****190X. Honors Contract (1)**

Independent study or discussion—3 hours. Prerequisite: open only to students in the Davis Honors Challenge. In-depth examination of material in an upper division course as defined in an Honors Contract. Proposal submitted by the student. Contract must be approved by the instructor and the Honors Council of the Academic Senate. May be repeated for credit.

**192. Internship (1-12)**

Internship—3-36 hours. Prerequisite: open only to students in the Davis Honors Challenge. Supervised work experience under the auspices of the Davis Honors Challenge. May be repeated for credit for a total of 12 units. (P/NP grading only.)

**194. Honors Seminar (3)**

Seminar—3 hours. Prerequisite: consent of instructor. Open only to students in the Davis Honors Challenge. Team-based work on actual problems drawn from the public or private sector. Focus on critical thinking and analytical interpretation, oral and written communication skills, and development of practical solutions to real-world problems. GE credit: Wrt.—F, S. (F, S.)

**195. Honors Thesis/Honors Project (1-3)**

Independent Study—3-9 hours. Prerequisite: Open only to students in the Davis Honors Challenge. Guided independent study of a selected topic leading to the presentation of an honors thesis/honors project. May be repeated for credit up to 9 units.

**198. Directed Group Study (1-5)**

Discussion—1-5 hours. Prerequisite: open only to students in the Davis Honors Challenge. May be repeated for credit. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)**

Independent study—1-5 hours. Prerequisite: open only to students in the Davis Honors Challenge. May be repeated for credit. (P/NP grading only.)

**University Honors Program****579****Courses in Integrated Studies (IST)****Lower Division****8. Colloquium (1)**

Discussion—1 hour. Lectures, films, and readings on the interrelation between the arts and sciences. May be repeated for credit. (P/NP grading only.)—F. (F.)

**8A. Special Topics in Natural Science and Mathematics (4)**

Lecture—3 hours; discussion—1 hour. Limited enrollment. Group study of a special topic in natural sciences and mathematics. Course varies with topic offered. May be repeated for credit. GE credit: SciEng, Wrt | SE, SL.—F, W, S. (F, W, S.)

**8B. Special Topics in Humanities (4)**

Lecture—3 hours; discussion—1 hour. Limited enrollment. Group study of a special topic in humanities. Course varies with topic offered. May be repeated for credit. GE credit: ArtHum, Wrt | AH.—F, W, S. (F, W, S.)

**8C. Special Topics in the Social Sciences (4)**

Lecture—3 hours; discussion—1 hour. Limited enrollment. Group study of a special topic in social sciences. Course varies with topic offered. May be repeated for credit. GE credit: SocSci, Wrt | SS.—F, W, S. (F, W, S.)

**9. Seminar (1)**

Lecture—1 hour. Preparation of a research report. Normally taken with course 8. May be repeated for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

**90. Seminar (1)**

Seminar—1 hour. Prerequisite: course 9; consent of instructor; completion of 45 units with a minimum GPA of 3.250. Limited to sophomores who participated in the Integrated Studies Honors Program during their freshman year and transfer students by consent of instructor. Interrelation between the arts and sciences, focusing on a special topic. (P/NP grading only.)—F. (F.)

**94. Seminar (1)**

Seminar—1 hour. Prerequisite: course 9, consent of instructor and completion of 45 units with a minimum GPA of 3.500. Restricted to sophomores who participated in the Integrated Studies Honors Program during their freshman year and other students by consent of instructor. The nature of research at the undergraduate level. (P/NP grading only.)

**Upper Division****190. Topics in Integrated Studies (1)**

Seminar—1 hour. Prerequisite: course 9. Discussion of the integration of the arts and sciences, focusing on a special topic. May be repeated three times for credit when topic differs. (P/NP grading only.)

**194HA. Special Study for Honors Students (4)**

Independent study—3 hours; seminar—1 hour. Prerequisite: course 9, consent of instructor and completion of 90 units with a minimum GPA of 3.500. A program of research culminating in the writing of a junior honors thesis under the direction of a faculty adviser. May be repeated one time for credit. (Deferred grading only, pending completion of sequence.)—F. (F.)

**194HB. Special Study for Honors Students (4)**

Independent study—3 hours; seminar—1 hour. Prerequisite: course 9, consent of instructor and completion of 90 units with a minimum GPA of 3.500. A program of research culminating in the writing of a junior honors thesis under the direction of a faculty adviser. May be repeated one time for credit. (Deferred grading only, pending completion of sequence.)—W. (W.)

**197T. Tutoring in Integrated Studies (1-4)**

Tutorial—1 hour. Prerequisite: consent of Director of Integrated Studies Honors Program. Open to students in the Integrated Studies Program only. Tutoring in Integrated Studies courses, usually in small discussion groups. Weekly discussions with the instructor on the subject matter of the course being

tutored and on the art and craft of teaching. May be repeated eight times for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

## University Writing Program

(College of Letters & Science)

Carl Whithaus, Ph.D., Program Director

**Program Office.** 109 Voorhies Hall  
530-752-6283; <http://writing.ucdavis.edu>

### Committee in Charge

Rebekka Andersen, Ph.D.

(University Writing Program)

Elizabeth Constable, Ph.D.

(Gender, Sexuality, and Women's Studies)

Pamela Demory, Ph.D. (University Writing Program)

Daniel Melzer (University Writing Program)

Dana R. Ferris, Ph.D. (University Writing Program)

Sarah Perrault, Ph.D. (University Writing Program)

Daniel Potter, Ph.D. (Plant Sciences)

Angie Louie, Ph.D. (BioMedical Engineering)

Christopher J. Thaiss, Ph.D.

(University Writing Program)

Carl W. Whithaus, Ph.D.

(University Writing Program)

### Faculty

Rebekka Andersen, Ph.D., Assistant Professor

Dana R. Ferris, Ph.D., Professor

Sarah Perrault, Ph.D., Assistant Professor

Christopher J. Thaiss, Ph.D., Professor

Carl W. Whithaus, Ph.D., Professor

### Affiliated Faculty

Sasha Abramsky, M.S., Lecturer

Cynthia J. Bates, M.A., Lecturer

Amy Clarke, Ph.D., Lecturer

Marlene B. Clarke, Ph.D., Lecturer

Academic Federation Excellence in Teaching Award

Pamela Demory, Ph.D., Lecturer

Aliki Dragona, Ph.D., Lecturer

Academic Federation Excellence in Teaching Award

Laurie Glover, Ph.D., Lecturer

Scott R. Herring, Ph.D., Lecturer

Academic Federation Excellence in Teaching Award

Brad J. Henderson, Ph.D., Lecturer

Andy Jones, Ph.D., Lecturer

Jeff Magnin, M.A., Lecturer

David Maisel, M.F.A., Lecturer

Sean McDonnell, Ph.D., Lecturer

Heather Milton, Ph.D., Lecturer

Stephen Magagnini, B.A., Lecturer

Pamela J. Major, Ph.D., Lecturer

James McElroy, Ph.D., Lecturer

Don Meisenheimer, Ph.D., Lecturer

John Samzel, Ph.D., Lecturer

Wrye Sententia, Ph.D., Lecturer

Victor Squitieri, Ph.D., Lecturer

Academic Federation Excellence in Teaching Award

Karma Waltonen, Ph.D., Lecturer

### The Program

The University Writing Program (UWP) offers writing courses and seeks to improve writing instruction across campus through a variety of programs. The UWP coordinates first year, intermediate, and advanced writing courses that satisfy college composition requirements and offers courses in writing across the curriculum, writing in specific disciplines, and writing in the professions. The Professional Writing Minor serves students from all majors who are planning careers as professional writers or editors, as well as those whose academic and professional careers demand advanced writing skills. The Program offers graduate courses in the teaching of writing and in composition theory, history, and research.

The Designated Emphasis in Writing, Rhetoric, and Composition Studies offers Ph.D. students in affiliated programs the opportunity to prepare for leadership roles in writing research, teaching, and program administration. The UWP also administers the English Composition Examination, an alternative way to satisfy the advanced writing requirement. The UWP publishes an annual anthology of exemplary student writing, *Prized Writing*, and a journal for writing instructors, *Writing on the Edge*. The Writing in the Disciplines Workshop Program presents workshops on teaching writing for faculty and TAs and workshops on writing for students. The Writing Ambassadors Program trains advanced undergraduates and places them as interns in K-12 classrooms to improve writing instruction.

### Minor Program Requirements:

UNITS

#### Professional Writing ..... 20

One course from each of the following four groups:

**Group A:** English 100NF, University Writing Program 101, 102A, 102B, 102C, 102D, 102E, 102F, 102G, 102H, 102I, 102J, 102K, 102L, 102M

**Group B:** University Writing Program 104A, 104B, 104C, 104D, 104E, 104F,

104I, 104J, 104T, 110, 111A, 111B, 111C

**Group C:** Anthropology 110, 120, Classics 110, Communication 101, 105, 152, Design 145, 149, English 105, English/Linguistics/UWP 106, English/Science and Technology Studies 164, History 101, Philosophy 137A, 137B, 137C, Technocultural Studies 191, University Writing Program 100, 112A, 120, 121

**Group D:** University Writing Program 192 (or equivalent)

Additional units to achieve a total of 20 upper division units ..... 4

One additional course from Groups A, B, or C above.

Note: At least twelve units must be from University Writing Program courses.

### Courses in University Writing Program (UWP)

#### Lower Division

##### 1. Expository Writing (4)

Lecture/discussion—4 hours. Prerequisite: completion of Entry-Level Writing Requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. Su. (F, W, S.)

##### 1V. Expository Writing (4)

Web virtual lecture—2 hours; web electronic discussion—2 hours. Prerequisite: completion of Entry-Level Writing Requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments. Not open to students who have taken course 1 or 1V. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. Su. (F, W, S.)

##### 1Y. Expository Writing (4)

Lecture/discussion—2 hours; web electronic discussion—2 hours. Prerequisite: completion of Entry-Level Writing Requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments. Not open to students who have taken course 1 or 1V. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. Su. (F, W, S.)

##### 10. Introduction to Professional Writing Studies (4)

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or the equivalent. Introduction to writing as an object of study and to theories and research in the field. Survey of how writing is created, disseminated, and used in private, public, and academic contexts. GE credit: ArtHum | AH, WE.—F. (F.)

### 11. Popular Science and Technology Writing (4)

Lecture/discussion—3 hours; discussion—1 hour. Positioning of science and technology in society as reflected and constructed in popular texts. Topics include genre theory, demarcation, rhetorical figures, forms of qualitative and quantitative reasoning, and the epistemic role of popularization in science. GE credit: ArtHum | AH, WE.—W. (W.)

### 12. Writing and Visual Rhetoric (4)

Lecture/discussion—3 hours; discussion—1 hour. Introduction to writing needs, conventions, and genres in design contexts. Emphasis on applying critical reading, analysis, and writing skills to designed products, such as graphics, visual communications, and clothes, and designed spaces, such as exhibitions and interior architecture. GE credit: ArtHum | AH, VL, WE.—F, W, S. (F, W, S.)

### 18. Style in the Essay (4)

Lecture/discussion—4 hours. Prerequisite: course 1 or English 3 or the equivalent. Style, language, and structure in the essay. Analyzing style, developing a voice in writing, revising sentences, developing effective paragraphs and arguments, and writing with force and clarity. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.)

### 19. Writing Research Papers (4)

Lecture/discussion—4 hours. Prerequisite: course 1 or English 3 or the equivalent. Critical reading, analysis, documentation, and writing research-based assignments. Formulation of research topics and development of effective arguments. Reading and writing assignments may focus on a single theme. GE credit: ArtHum, Wrt | AH, WE.—F, W. (F, W.)

### 21. Introduction to Academic Reading and Writing for Multilingual Students (4)

Lecture/discussion—4 hours. Pass One placed in the course via the English Language Placement Examination (ELPE) offered by the UWP; students receiving scores below 70 are placed in course 21, the first course in the sequence. Reading and writing paragraphs and short multi-paragraph texts for academic purposes. Suitable for students whose primary home language was not English. —F, W, S. (F, W, S.)

### 22. Intermediate Academic Reading and Writing for Multilingual Students (4)

Lecture/discussion—4 hours. Prerequisite: Pass One passed course 21 with C- or better OR a score of 70-79 on the English Language Placement Examination (ELPE) offered by the UWP. Reading and writing short multi-paragraph texts for academic purposes. Suitable for students whose primary home language was not English. —F, W, S. (F, W, S.)

### 23. Advanced Academic Reading and Writing for Multilingual Students (4)

Lecture/discussion—4 hours. Prerequisite: course 22. Pass One passed course 22 with a C- or better OR a score of 80-89 on the English Language Placement Examination (ELPE) offered by the UWP. Reading and writing source/research-based texts for academic purposes. Suitable for students whose primary home language was not English. (P/NP grading only.)—F, W, S. (F, W, S.)

### 27. Persuasive Writing for Multilingual Students (4)

Lecture/discussion—4 hours. Prerequisite: course 1 or equivalent. Not open to students with C- (P) or better in courses 101, 102, and 104; class size limited to 18 students. Instruction in analyzing style of persuasive texts, using appropriate vocabulary, and applying English grammatical structures for argumentative purposes. Suitable for multilingual students desiring additional instruction in the linguistic and rhetorical features of persuasive English writing for academic purposes. GE credit: WE.—F, W, S. Su. (F, W, S., Su.)

### 92. Internship in Writing (1-12)

Internship—3-36 hours. Prerequisite: course 1 or English 3. Internships in fields where students can practice their skills. May be repeated for credit for a total of 12 units. (P/NP grading only.)

**98. Directed Group Study (1-5)**

Prerequisite: course 1 or English 3 or the equivalent; consent of instructor. May be repeated two times for credit. (P/NP grading only.) GE credit: AH, WE.

**99. Special Study for Undergraduates (1-5)**

Prerequisite: course 1 or English 3 or the equivalent; consent of instructor. (P/NP grading only.) GE credit: AH, WE.

**Upper Division****100. Genre Theory and Professional Writing (4)**

Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 1 or the equivalent; course 10. Introduction to discipline of professional writing. Examination of writing as a social practice, using genre theory as a conceptual framework. Analysis of how genres function rhetorically in specific contexts and how social systems both shape and are shaped by genres. GE credit: AH, WE.—W. (W.)

**101. Advanced Composition (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing. Instruction in advanced principles of expository writing. Writing tasks within and beyond the University. Different writing modes, including narrative, analysis, explanation, argument, critique. GE credit: ArtHum, Wrt | AH, WE.—F, W, S, Su. (F, W, S, Su.)

**102A. Writing in the Disciplines: Special Topics (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing. Open to majors or to students concurrently enrolled in an upper division course in a specific academic discipline or interdisciplinary field. Advanced instruction in writing in that discipline and practice in effective styles of communication. May be repeated one time for credit if taken in conjunction with a different subject-matter course. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.)

**102B. Writing in the Disciplines: Biology (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing. Open to majors in a biological science or to students concurrently enrolled in an upper division biological science course. Advanced instruction in writing in biology. Not open for credit to students who have completed English 102B. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.)

**102C. Writing in the Disciplines: History (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing. Open to majors in history or to students concurrently enrolled in an upper division course accepted for the history major.

Advanced instruction in writing in history. GE credit: ArtHum, Wrt | AH, WE.—W. (W.)

**102D. Writing in the Disciplines: International Relations (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing. Open to majors in international relations or to students concurrently enrolled in an upper division course accepted for the major.

Advanced instruction in writing in international relations. GE credit: ArtHum, Wrt | AH, WE.—W. (W.)

**102E. Writing in the Disciplines: Engineering (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing. Open to upper division students in the College of Engineering and to students enrolled in an upper division engineering or computer science course for the major. Advanced instruction in writing in engineering. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.)

**102F. Writing in the Disciplines: Food Science and Technology (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing. Open to majors in food sci-

ence and technology and to students concurrently enrolled in an upper division course in food science and technology. Advanced instruction in writing in food science and technology. GE credit: ArtHum, Wrt | AH, WE.—S. (S.)

**102G. Writing in the Disciplines: Environmental Writing (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing. Open to students with upper division coursework with an environmental focus. Advanced instruction in writing and practice in effective styles of communication in the fields of environmental study, policy, or advocacy. Not open for credit to students who have completed course 102A in the same academic field. GE credit: ArtHum, Wrt | AH, WE.—S. (S.)

**102H. Writing in the Disciplines: Human Development and Psychology (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing. Open to majors and minors or to students concurrently enrolled in an upper division course in Human Development or Psychology. Advanced instruction in writing and practice in effective styles of communication in Human Development and Psychology. Not open for credit to students who have completed course 102A in the same academic field. GE credit: ArtHum, Wrt | AH, WE.—F. (F.)

**102I. Writing in the Disciplines: Ethnic Studies (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing. Open to majors and minors in ethnic studies, or students with upper division coursework focusing on race and ethnicity. Advanced instruction in cross-disciplinary writing about race and ethnicity and practice in effective styles of communication. Not open for credit to students who have completed. GE credit: ArtHum, Wrt | AH, WE.—F. (F.)

**102J. Writing in the Disciplines: Fine Arts (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing. Open to majors and minors or to students concurrently enrolled in an upper division course in Art History, Art Studio, Design, Music, or Theater and Dance. Advanced instruction in writing about the arts and practice in effective styles of communication. Not open for credit to students who have completed course 102A in the same academic field. GE credit: ArtHum, Wrt | AH, WE.—F, S. (F, S.)

**102K. Writing in the Disciplines: Sociology (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing. Open to majors and minors in Sociology or to students concurrently enrolled in an upper division Sociology course. Advanced instruction in writing and practice in effective styles of communication in Sociology and related academic and professional fields. Not open for credit to students who have completed course 102A in the same academic field. GE credit: ArtHum, Wrt | AH, WE.—S. (S.)

**102L. Writing in the Disciplines: Film Studies (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing. Open to majors and minors or to students concurrently enrolled in an upper division course in Film Studies, Technocultural Studies, English, American Studies, or any other upper division course that includes the analysis and understanding of film as a medium. Advanced instruction in writing about film and practice in effective styles of communication. Not open for credit to students who have completed course 102A in the same academic field. GE credit: ArtHum, Wrt | AH, WE.—W. (W.)

**102M. Writing in the Disciplines: Community and Regional Development (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or the equivalent. Open to upper division Community and Regional Development majors and minors or upper division students concurrently enrolled in an upper division Community and Regional Development course. Advanced instruction in writing in the Community and Regional Development discipline and practice in effective styles of communication. GE credit: ArtHum | ACGH, AH, WE.—S. (S.)

**104A. Writing in the Professions: Business Writing (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing. Effective communication in and for organizations, including businesses (corporations), government agencies, and non-profit organizations. Suitable for students entering careers that require substantial communications, such as management, public relations, and grant writing. GE credit: ArtHum | AH, WE.—F, W, S. (F, W, S.)

**104B. Writing in the Professions: Law (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing. Advanced principles of critical thinking, argumentation, and style, with special emphasis on their application in the legal profession. Suitable for students planning careers in law, business, administration, or management. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.)

**104C. Writing in the Professions: Journalism (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing. Non-fiction for magazines and newspapers, with attention to style and language. Emphasis on research, interviewing, market analysis, and query letters. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.)

**104D. Writing in the Professions: Elementary and Secondary Education (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing. Advanced expository writing in the contemporary American classroom. Strongly recommended for teaching credential candidates. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.)

**104E. Writing in the Professions: Science (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing or enrollment in a graduate science curriculum. Writing abstracts, research proposals, scientific papers, other forms of scientific communication. Presenting data graphically. Primarily for students engaged in or planning careers in basic or applied research. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.)

**104F. Writing in the Professions: Health (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing. Advanced expository writing common in the health professions, emphasizing effective communication between the writer and different audiences. Topics relate to health, disability, and disease. Suitable for students planning careers in professions such as medicine, dentistry, physical therapy, optometry. GE credit: ArtHum, Wrt | AH, WE.—F, W, S. (F, W, S.)

**104FY. Writing in the Professions: Health (4)**

Lecture/discussion—1.5 hours; web electronic discussion—1.5 hours; extensive writing. Prerequisite: course 1 or the equivalent; upper division standing. Advanced expository writing common in the health professions, emphasizing effective communication between the writer and different audiences. Topics relate to health, disability, and disease. Suitable for students planning careers in professions such as medicine, dentistry, physical therapy, optometry. Not

open to students who have taken course 104F. GE credit: ArtHum | AH, WE.—F, W, S, Su. (F, W, S, Su.)

#### **104I. Writing in the Professions: Internships (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing. Open to students concurrently enrolled in an internship and to Contemporary Leadership minors. Advanced instruction in writing in the workplace, including public and private sectors, government agencies, profit and non-profit organizations. Collaborative work and practice in effective styles of communication. Not open for credit to students who have completed course 102A. Offered irregularly. GE credit: ArtHum, Wrt | AH, WE.—S. (S.)

#### **104J. Writing in the Professions: Writing for Social Justice (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or the equivalent; upper-division standing. Advanced instruction in writing for Social Justice, using an interdisciplinary approach combining feminist, critical race, ethnic, cultural, and transnational studies; practice in techniques of research and styles of communication for diverse audiences. Suitable for activists in community organizing, nonprofits, politics. GE credit: ArtHum | AH, WE.—W. (W.)

#### **104T. Writing in the Professions: Technical Writing (4)**

Lecture/discussion—3 hours; extensive writing. Communicating effectively about technology and other technical subjects to varied audiences for varied purposes. Suitable for students entering professions that require communicating technical information to subject matter experts, managers, technicians, and non-specialists. Not open for credit to students who have taken course 104A prior to Fall 2012. GE credit: ArtHum | AH, WE.—F, W, S. (F, W, S.)

#### **106. English Grammar (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or English 3 or Linguistics 1 or consent of instructor. Survey of present-day English grammar as informed by contemporary linguistic theories. The major syntactic structures of English; their variation across dialects, styles, and registers; their development; and their usefulness in describing the conventions of English. (Same course as English 106 and Linguistics 106.) GE credit: ArtHum | AH.

#### **110. Specialized Genres in Professional Writing (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: satisfaction of the upper-division writing requirement. Restricted to upper-division students who have satisfied the upper-division writing requirement. Counts toward the writing minor. Instruction in the elements and practices of professional writing in specialized genres. May be repeated two times for credit when topic differs. Offered irregularly. GE credit: ArtHum, Wrt | AH, WE.

#### **111A. Specialized Topics in Journalism (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: satisfaction of the upper-division writing requirement. Restricted to upper-division students with a strong interest in journalism. Counts toward the writing minor. Instruction in the elements and practices of advanced journalism. May be repeated one time for credit if specialized journalism topic for each course differs. Offered irregularly. GE credit: ArtHum, Wrt | AH, WE.

#### **111B. Specialized Topics in Journalism: Investigative Journalism (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: satisfaction of the upper-division writing requirement. Restricted to upper-division students with a strong interest in journalism; counts toward the writing minor. Instruction in the elements and practices of in-depth investigative journalism. Offered in alternate years. GE credit: ArtHum, Wrt | AH, WE.—(W.)

#### **111C. Specialized Topics in Journalism: Science Journalism (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: satisfaction of the upper-division writing requirement. Restricted to upper-division students with a strong interest in journalism. Counts toward the writing minor. Instruction in the elements and practices of science journalism. Offered in alternate years. GE credit: ArtHum, Wrt | AH, WE.—W.

#### **112A. Introduction to Professional Editing (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: satisfaction of the upper-division writing requirement. Restricted to upper-division students who have satisfied the upper-division writing requirement; counts toward the writing minor, Group C: Theory, History, and Design. Introduction to general editing practices and principles, with an emphasis on professional editing in organizational contexts, including academia and the workplace. Extensive practice in copy, comprehensive, and collaborative editing. Offered irregularly. GE credit: ArtHum, Wrt | AH, VL, WE.

#### **120. Rhetorical Approaches to Scientific and Technological Issues (4)**

Lecture/discussion—3 hours; extensive writing. Restricted to upper-division standing. Application of rhetorical theories to scientific issues. Topics include: Rhetorical dimensions of scientific knowledge-making; scientific voice; rhetorical figures in science; incommensurability and demarcation; epistemology, definition, and classification; science wars; models of scientific literacy and accommodation, and implications for risk communication. Offered in alternate years. GE credit: ArtHum or SciEng | AH or SE, WE.—W.

#### **121. History of Scientific Writing (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: upper division standing. History of scientific writing from the 17th century to the present; origins and evolution of scientific genres; role of scientific writing in producing scientific knowledge; discursive differences between disciplines; emergence of English as a global language of science. Offered in alternate years. GE credit: ArtHum or SciEng | AH or SE, SL, WE.—(S.) Andersen, Perrault, Whithaus

#### **190. Capstone Portfolio Seminar (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: course 100. Open to majors who have completed 135 units. Capstone course for majors. Synthesis and application of rhetorical concepts learned in the major. Development of professional digital and print portfolio for graduate school and career applications. GE credit: WC.—S. (S.)

#### **192. Internship in Writing (1-12)**

Internship—3-36 hours. Prerequisite: course 1 or English 3 or the equivalent; consent of instructor. Internships in fields where students can practice their skills. May be repeated up to 12 units for credit. (P/NP grading only.) GE credit: AH.

#### **197T. Tutoring in Writing (1-5)**

Tutoring—1-5 hours. Prerequisite: upper division standing; consent of instructor. Tutoring one-on-one or leading small voluntary discussion groups affiliated with a writing course. May be repeated up to 10 units for credit. (P/NP grading only.) GE credit: AH.

#### **197TC. Community Tutoring in Writing (1-4)**

Tutoring—1-4 hours. Prerequisite: upper division standing; consent of instructor. Field experience, with individuals or in K-12 classroom instruction, focusing on reading- and writing-to-learn strategies in any subject area. May be repeated up to 10 units for credit. (P/NP grading only.) GE credit: AH.

#### **198. Directed Group Study (1-5)**

Prerequisite: course 1 or English 3 or the equivalent; consent of instructor. May be repeated up to 10 units for credit. (P/NP grading only.) GE credit: AH, WE.

#### **199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.) GE credit: AH, WE.

#### **Graduate**

#### **220. Rhetorical Approaches to Genre Study (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: graduate standing or consent of instructor. Using genre theory and methods of analysis to understand and prepare to do research on different types of writing in varying academic and professional contexts. Emphasis on problems in organizational, professional, and/or interdisciplinary communication. Offered in alternate years.—F, W. (F, W.) Andersen, Ferris, Perrault, Thaiss, Whithaus

#### **250. Writing Assessment (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: graduate standing or consent of instructor. Examines key testing and measurement concepts; the history of writing assessment; and relationships among writing tests and methods of teaching writing; the impacts of Information and Communication Technology (ICT), and how educational policies both drive and respond to writing assessments. Offered in alternate years.—(W.) Whithaus

#### **253. Writing Program Administration (4)**

Lecture/discussion—3 hours; extensive writing. Theories, models, and procedures of writing programs, primarily in higher education. Developmental, first-year, and advanced writing programs, writing centers, writing-across-the-curriculum programs, writing minors and majors, and graduate programs in rhetoric and composition. Offered in alternate years.—Ferris, Thaiss, Whithaus

#### **255. Theory and Research in Response to Student Writing (4)**

Discussion—3 hours; extensive writing: extensive writing or discussion; project. Restricted to graduate standing. Intensive focus on the critical topic of response or feedback to student writers. Coverage of philosophy, theory, and empirical research on teacher written feedback, teacher-student writing conferences, peer response, and error correction. Offered in alternate years.—W. (W.) Ferris

#### **270. Literacy and Technology (4)**

Lecture/discussion—3 hours; extensive writing. Prerequisite: graduate standing or consent of instructor. Examines how the physical qualities of texts offer different affordances during production and reception; grounds these discussions in the development of literacy practices and writing technologies from ancient to contemporary; creates frameworks for research into literacy, teaching, and textual technologies. Offered in alternate years.—(W.) Andersen, Whithaus

#### **271. Second Language Writing (4)**

Seminar—3 hours; extensive writing; project. Prerequisite: graduate standing. Restricted to graduate standing. Traces the history of second language writing theory and research on second language writers in a variety of academic and professional contexts. Emphasis on writer characteristics, texts, and contexts. Offered irregularly.—F, S. (F, S.) Ferris

#### **280. Journal Editing Workshop: Writing on the Edge (2)**

Seminar—2 hours. Reading and critiquing manuscript submissions. Discussing relevant work in the field of writing studies. Applying principles of professional editing. Developmental editing, copy-editing, and typesetting of accepted manuscripts. Soliciting articles and communicating with contributors. Students encouraged to enroll both quarters. May be repeated for credit. (S/U grading only.)—F, W. (F, W.) Masiel

#### **298. Directed Group Study (1-5)**

Prerequisite: graduate standing; consent of instructor. (S/U grading only.)

#### **299. Individual Study (1-12)**

Prerequisite: consent of instructor; graduate standing. (S/U grading only.)

**Professional****390. Theory and Practice of Teaching University-Level Composition (4)**

Seminar—3 hours; extensive writing. Open to graduate students teaching course 1 in the fall quarter following this course. Examination of current theories and practices in teaching of writing. Practical application to undergraduate writing courses. Emphasis on designing assignments and class sequences, and responding to student writing. Examination of impact of cultural, technological and theoretical changes on composition pedagogy.—W. (W.) Ferris

**392. Teaching Expository Writing (2)**

Discussion—2 hours. Prerequisite: graduate standing, appointment as Teaching Assistant in the Composition Program; completion of course 390 or the equivalent. Discussion of problems related to teaching expository writing at the university level, with special emphasis on teaching reading and writing skills and responding to student papers. (S/U grading only.)—F. (F.)

**396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing; consent of instructor. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

## **Urban Planning**

See **Environmental Science and Policy, on page 327.**

## **Urology**

See **Medicine, School of, on page 427.**

## **Vegetable Crops**

See **Plant Sciences, on page 514.**

## **Veterinary Medicine, School of**

Michel D. Lairmore, D.V.M., Ph.D., Dean of the School

Patricia A. Conrad, D.V.M., Ph.D., Associate Dean—Global Programs

Jan E. Illkiw, B.V.Sc., Ph.D., Associate Dean—Academic Programs

Sean D. Owens, D.V.M., Associate Dean—Admissions and Student Programs

John R. Pascoe, B.V.Sc., Ph.D., Executive Associate Dean

Isaac N. Pessah, Ph.D., Associate Dean—Research and Graduate Education Programs

Jane Sykes, B.V.Sc., Ph.D., Interim Associate Dean—Clinical Programs and Director—Veterinary Medical Teaching Hospital

**School Office.** 530-752-1360;  
<http://www.vetmed.ucdavis.edu>

### **Departmental Courses**

#### **Anatomy, Physiology and Cell Biology (APC)**

##### **Lower Division**

**92. Internship (1-12)**

Internship—3-36 hours. Prerequisite: lower division standing; consent of instructor. Internship experience off and on campus in all subject areas offered in the

Department of Anatomy, Physiology & Cell Biology. Internships are supervised by a member of the faculty. Offered irregularly. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

### **Upper Division**

**100. Comparative Vertebrate Organology (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Science 1A and 1B or 2A and 2B. Functional anatomy of major organ systems in vertebrates. Each system examined from cellular to gross level in fish, birds, and mammals. Emphasis on how differentiated cell types are integrated into tissues and organs to perform diverse physiological functions. (Same course as Neurobiology, Physiology, and Behavior 123.)—F. (F.) Genetos

**192. Internship (1-15)**

Internship—3-45 hours. Prerequisite: upper division standing, approval of internship. Internship experience off and on campus in all subject areas offered in the Department of Anatomy, Physiology and Cell Biology. Internships are supervised by a member of the faculty. May be repeated for credit if topic differs. (P/NP grading only.)

**198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S. (F, W, S.)

**199. Special Study for Advanced Undergraduates (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S. (F, W, S.)

### **Graduate**

**286. Basics of Microscopy and Cellular Imaging (2)**

Lecture—1 hour; laboratory—2 hours. Prerequisite: graduate standing; consent of instructor. Class size limited to 20 students. Practical applications of basic microscope techniques used to image cells and tissues with the goal of using these techniques to generate publication quality images. Principles of light, epifluorescent, confocal and electron microscopy, their applications and limitations. Offered in alternate years.—S. Van Winkle

**290. Seminar (1)**

Seminar—1 hour. Discussion and critical evaluation of advanced topics and current trends in research. (P/NP grading only.)—F, W, S. (F, W, S.) Van Winkle

**291. Topics in Biology of Respiratory System (1)**

Seminar—1 hour. Prerequisite: graduate standing; consent of instructor. Topics concerning structure and function of respiratory system. Possible topics include: lung growth, pulmonary reaction to toxicants, pulmonary inflammation, lung metabolism, biology of lung cells, tracheobronchial epithelium, nasal cavity structure and function. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.) Pinkerton, Wu

**298. Group Study (1-5)**

Laboratory—6-15 hours. Prerequisite: consent of instructor.—F, W, S. (F, W, S.) Genetos, Meyers

**299. Research (1-12)**

Laboratory—6-36 hours. Prerequisite: consent of instructor. (S/U grading only.)—F, W, S. (F, W, S.)

### **Medicine and Epidemiology (VME)**

#### **Upper Division**

**158. Infectious Disease in Ecology and Conservation (3)**

Lecture—3 hours. Prerequisite: Evolution and Ecology 101 or Environmental Science and Policy 100 or Veterinary Medicine 409 or equivalent. Introduction to the dynamics and control of infectious disease in wildlife, including zoonotic diseases and those threatening endangered species. Basic epidemiological models and application to field data. Scientists' role in developing disease control policies.—W. (W.) Foley

**198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)—W. (W.)

**199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.)—F, W, S. (F, W, S.)

### **Graduate**

**201. Emerging Issues at the Interface of Ecosystem, Animal and Human Health (3)**

Lecture—1 hour; discussion—2 hours. Prerequisite: Active student status in MPVM, Master of Public Health programs or graduate groups in Epidemiology, Ecology, Public Health, Comparative Pathology, or consent of instructor. Restricted to 20 students. Principles of one health with emphasis on the relationships and interdependence of environmental, animal and human health. Exploration of critical data gaps needed to achieve sustainability in ecosystems and disease prevention.—F. (F.) Johnson

**217. Evaluation and Use of Diagnostic Tests (2)**

Lecture—14 sessions; laboratory—6 sessions; discussion—3 sessions. Prerequisite: Preventive Veterinary Medicine 205 or Epidemiology 205; consent of instructor. Class size limited to 30 students. Clinical and epidemiologic properties and application of diagnostic tests for disease, with emphasis on selecting tests; validating, evaluating, and interpreting new tests individually and in aggregate; determining cutoff values; and developing testing strategies. Offered in alternate years.—(S.) Hill

**225. Retroviral Pathogenesis Seminar/Journal Club (1)**

Discussion—1 hour. Prerequisite: graduate student status in the Comparative Pathology, Microbiology or Immunology graduate groups. Participatory seminar addressing the mechanisms of retroviral pathogenesis in a journal club format. Focus on the review of current scientific journal papers concerning viral pathogenesis, immunology and virology with a special focus on retroviruses. May be repeated 12 times for credit. (S/U grading only.)—F, W, S. (F, W, S.) Murphy, Sparger

**258. Infectious Disease in Ecology and Conservation (1)**

Discussion—2 hours. Prerequisite: course 158 (must be taken concurrently). Presentation, analysis and discussion of primary literature on the dynamics and control of infectious disease in wildlife, including zoonotic diseases and those threatening endangered species. Multidisciplinary approach combines perspectives of ecology and veterinary medicine. (S/U grading only.)—W. (W.) Foley

**298. Group Study (1-5)**

Prerequisite: student in School of Veterinary Medicine or consent of instructor. Group study in selected areas of the clinical sciences. (S/U grading only.)—F, W, S. (F, W, S.) Martinez

**299. Research (1-12)**

(S/U grading only.)—F, W, S. (F, W, S.)

### **Molecular Biosciences (VMB)**

#### **Lower Division**

**92. Internship (1-12)**

Internship—3-36 hours. Prerequisite: lower division standing; consent of instructor. Work experience off and on campus in all subject areas offered in the Department of Molecular Biosciences. Internships supervised by a member of the faculty. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

**101Y. Principles of Pharmacology and Toxicology (3)**

Laboratory/discussion—1.5 hours; web virtual lecture—1.5 hours; web electronic discussion—0.5 hour; autotutorial—5 hours. Prerequisite: upper division standing in a science major; Chemistry through organic chemistry and general biology, or consent from instructor; good standing with university; computing capability using MS Word, Excel, and PowerPoint; menu driven software programs, SmartSite; computer, or ready access to a computer, with

broadband Internet access. Restricted to upper division undergraduate students in good standing with school and fulfill course prerequisites. Hybrid course provides training in core concepts of pharmacological and toxicological sciences. Develop higher-order problem solving and critical thinking skills. GE credit: OL, SE, SL.—S. (S.) Puschne

## Upper Division

### 192. Internship (1-12)

Internship—3-36 hours. Prerequisite: completion of 84 units; consent of instructor. Work experience off and on campus in all subject areas offered in the Department of Molecular Biosciences. Internships supervised by a member of the faculty. May be repeated for credit. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

### 199. Special Study for Advanced Undergraduates (1-5)

(P/NP grading only.)—F, W, S. (F, W, S.)

## Graduate

### 234. Current Topics in Neurotoxicology (3)

Lecture—3 hours. Prerequisite: core courses in one of the following graduate programs: Pharmacology and Toxicology, Agricultural and Environmental Chemistry, Biochemistry and Molecular Biology, Cell and Developmental Biology, Immunology, Molecular Cellular and Integrative Physiology or Neuroscience. Restricted to upper level undergraduate students must obtain permission from the course coordinator. General principles of neurotoxicology, the cell and molecular mechanisms and health impacts of specific neurotoxicants and the contribution of neurotoxic compounds to complex neurodevelopmental disorders and neurodegenerative diseases. (Same course as Environmental Toxicology 234 and Molecular, Cellular, and Integrative Physiology 234.)—S. (S.) Lein

### 253. Metabolism of Toxicants and Drugs (2)

Lecture—2 hours. Prerequisite: Pharmacology and Toxicology 201, 202, 203, general biochemistry or consent of instructor. Significance/chemical pathways of toxicants and drug metabolism, enzymology and molecular aspects of P450 and flavin monooxygenases, hydrolases and phase 2 transferases and experimental approaches for metabolism studies. Offered in alternate years. —(W.) Yu

### 254. Toxicology of the Respiratory System (3)

Lecture—3 hours; discussion. Prerequisite: Pharmacology and Toxicology 201, 202, 203, or consent of instructor. Survey of structure and function of the respiratory system, the pathophysiology of major lung diseases, the interactions of toxicants with the lung and response of this organ to injury. Offered in alternate years. —(W.) Pinkerton

### 255. Pharmacokinetics and Biopharmaceuticals (2)

Lecture—16 sessions; discussion—4 sessions. In-depth study of pharmacokinetics, including the fundamentals of pharmacokinetics, how to design a pharmacokinetic study and how to use both compartmental and non-compartmental analysis to interpret the data. Offered in alternate years. —W. Knych

### 290. Seminar (1)

Seminar—1 hour. Prerequisite: graduate standing; consent of instructor. Topics in nutrition, pharmacology/toxicology, and biochemistry. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

### 297T. Tutoring in Graduate Molecular Biosciences (1-5)

Prerequisite: graduate or professional student standing and consent of instructor. Assist in preparation and teaching of courses in Nutrition, Pharmacology and Toxicology, or other courses offered by the department under direct supervision of the instructor. Designed for graduate or professional students who desire teaching experience in graduate courses. May be repeated up to 5 units of credit. (S/U grading only.)—F, W, S. (F, W, S.)

### 298. Group Study (1-5)

(S/U grading only.)—F, W, S, Su. (F, W, S, Su.)

### 299. Research (1-12)

(S/U grading only.)—F, W, S. (F, W, S.)

## Professional

### 397T. Tutoring in Molecular Biosciences (1-5)

Discussion—1.5 hours. Prerequisite: graduate or professional standing; consent of instructor. Experience in professional curriculum for graduate or professional students, not teaching assistants, under direct supervision of instructor. May be repeated up to 5 units of credit (S/U grading only.)—F, W, S. (F, W, S.)

## Pathology, Microbiology, and Immunology (PMI)

### Lower Division

### 99. Special Study for Undergraduates (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

## Upper Division

### 126. Fundamentals of Immunology (3)

Lecture—3 hours. Prerequisite: Biological Sciences 102 or the equivalent or consent of instructor. Overview of immunology including components of the immune system, initiation and regulation of the immune response, infection and immunity, hypersensitivity and immune dysfunction. Clinical immunologic techniques, immunodeficiency and vaccination. —W. (W.) Stott

### 126L. Immunology Laboratory (2)

Laboratory—6 hours. Prerequisite: course 126 or the equivalent (may be taken concurrently). Laboratory procedures in clinical immunology. Cells of the innate and adaptive systems. Quantitative and qualitative characterization of the immune response. —W. (W.) Stott

### 127. Medical Bacteria and Fungi (5)

Lecture—3 hours; laboratory—6 hours. Prerequisite: any Microbiology course with lab; Immunology strongly recommended. Introduction to the bacterial and mycotic pathogens of man and animals, with emphasis on pathogenic mechanisms and ecologic aspects of infectious disease. —S. (S.) LeFebvre

### 128. Biology of Animal Viruses (3)

Lecture—3 hours. Prerequisite: Biological Sciences 102. Fundamental physical and chemical properties of animal viruses; methods of propagation, purification and assay. Mechanisms of viral replication and pathogenesis of viral infections in man and animals. Immunity to virus diseases and oncogenic properties of animal viruses. Two units of credit to students who have completed Microbiology 162. —S. (S.) Miller

### 129Y. One Health: Human, Animal & Environment Interfaces (3)

Lecture/discussion—3 hours; web electronic discussion. Class size limited to upper division undergraduate students in good standing with the school and who fulfill the course prerequisites below; enrollment limited to 100 students/term. Introduction to fundamentals, challenges, and opportunities in One Health using local and global health case studies. Animal, human, and environmental health problems, along with tools and transdisciplinary approaches, will be introduced to foster innovative thinking that addresses complex issues. GE credit: SciEng or SocSci | OL, SE or SS, SL.—S. (S.) Smith

### 198. Directed Group Study (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

### 199. Special Study for Advanced Undergraduates (1-5)

(P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

## Graduate

### 201. Integrative Pathobiology Core I (5)

Lecture—3 hours; discussion—2 hours. Overview of molecular biology techniques, tissue structure and function, cell membrane pathology and cellular mechanisms of disease including cellular responses and adaptations to stress, cell cycle, cell death, cell biomechanics, vascular disturbances, and mechanisms of neoplasia and tumorigenesis. —W. (W.)

### 202. Integrative Pathobiology Core II (4)

Lecture—2 hours; discussion—2 hours. The second required core course in the graduate group with topics in inflammation, host-pathogen interaction, regenerative medicine, integrative pathology and population and ecosystem health. —S. (S.) Foley

### 203. Experimental Design and Data Analysis in Pathobiology (2)

Lecture—1 hours; lecture/laboratory—2 hours. Follows two required core courses in, courses 201 and 202, for Ph.D. and M.S. students. Goal is to bridge gap between statistics and real-world pathobiology to increase students' skills and independence in experiment design and data analysis. —F. (F.)

### 214. Vector-borne Infectious Diseases: Changing Patterns (2)

Lecture/discussion—2 hours. Prerequisite: graduate student standing (PhD or MS). Restricted to 10 students. Vector-borne infectious diseases especially as they relate to changing patterns associated with climatic changes, trade and population movement. Prerequisite: consent of instructor. (S/U grading only.)—F. (F.) Coffey, Lanzaro

### 221. Topics in Virus Research (1)

Discussion—1 hour. Prerequisite: graduate student standing (Ph.D. or M.S.). Restricted to 10 students. Discussion-based seminar covering graduate student virology research. Informal presentations and discussion of technical problems in research design and experimentation are encouraged. Current stage of the research project is not important. May be repeated four times for credit. (S/U grading only.)—F. (F.) Murphy

### 270. Advanced Immunology (3)

Lecture—2 hours; discussion—1 hour. Prerequisite: Introductory course in immunology. Restricted to graduate student status in the Comparative Pathology Graduate Group; all other students require consent of instructor. Current concepts of immunology with an emphasis on interactions between the host, the environment and the pathogen. These interactions will include those that are protective and successful for the host as well as those that are deleterious. —W. (W.) Stott

### 290. Seminar (1)

Seminar—1 hour. Prerequisite: graduate level standing. Topics in pathology, microbiology or immunology. May be repeated for credit. (S/U grading only.)—F, W, S, Su. (F, W, S, Su.)

### 291A. Seminar in Immunology (1)

Seminar—1 hour. Prerequisite: course 126 or the equivalent. Students choose topic for each quarter. Individual or pairs of students choose a paper for all to read and present a seminar based on the subject of the paper. All students participate in discussion. May be repeated for credit. (S/U grading only.)—F, S. (F, S.) Gershwin

### 293A. Seminar in Infectious Diseases (1)

Seminar—1 hour. Prerequisite: current enrollment in health science professional school or graduate standing in biological sciences. Discussion of current topics and cases of infectious diseases. May be repeated one time for credit if topic differs. (S/U grading only.)—F. (F.) Byrne

### 298. Group Study (1-5)

Prerequisite: consent of instructor. (S/U grading only.)—F, W, S, Su. (F, W, S, Su.)

### 299. Research (1-12)

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)—F, W, S, Su. (F, W, S, Su.)

## Population Health and Reproduction (PHR)

### Lower Division

#### 92. Internship in Veterinary Science (1-4)

Discussion/laboratory—1-4 hours; clinic—3-36 hours; final report. Prerequisite: approval of project prior to period of internship by faculty sponsor. Supervised work experience in reproduction. (P/NP grading only.)—F, W, S. (F, W, S.)

### Upper Division

#### 106. Human-Animal Interactions: Benefits and Issues (2)

Lecture—18 sessions; fieldwork—1 session. Prerequisite: upper division standing or consent of instructor. The contributions of animals to human society, including historic, anthropologic, developmental, human health and therapeutic perspectives, as well as effects of humans on animals. One field trip required. —W. (W.) Hart

#### 192. Internship in Veterinary Science (1-12)

Discussion/laboratory—1-12 hours; clinic—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work experience in Reproduction. May be repeated for credit. (P/NP grading only.)—F, W, S. (F, W, S.)

#### 198. Directed Group Study (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S. (F, W, S.)

#### 199. Special Study for Advanced Undergraduates (1-5)

(P/NP grading only.)—F, W, S. (F, W, S.)

### Graduate

#### 202. Sampling in Health-Related Research (3)

Lecture—3 hours. Prerequisite: Preventive Veterinary Medicine 403 or the equivalent; consent of instructor. A very thorough coverage of simple random sampling, stratified sampling, cluster sampling, systematic sampling and other sampling methods applied extensively in epidemiology and other health-related disciplines. Emphasis on application of the sampling methods. Offered in alternate years. —W. (W.)

#### 203. Multivariate Biostatistics (3)

Lecture—3 hours. Prerequisite: Preventive Veterinary Medicine 403 and 404, or the equivalent; consent of instructor. Multivariate procedures covered are principal component analysis, factor analysis, Two-group and k-group multivariate ANOVA, multivariate regression, Two-group and k-group discriminant analysis and repeated measures analysis, cluster analysis, and canonical analysis. Emphasis is on application of procedures. Offered in alternate years. —W.

#### 210. Epidemiological Approaches to Waterborne Zoonotic Pathogens (1)

Lecture—1 hour. Waterborne zoonotic diseases remain a significant cause of human illness. Review key waterborne pathogens; their biology, fate and transport in aquatic systems; on-farm management practices for reducing microbial contamination of California's fresh and marine aquatic resources from livestock production systems. (S/U grading only.)—W. (W.) Atwill

#### 212. Epidemiology of the Zoonoses (4)

Lecture—35 sessions; discussion—5 sessions. Prerequisite: graduate standing or third-year standing in the School of Veterinary Medicine or consent of instructor. Epidemiological, biological and ecological features of some major infections shared by humans and other animals. Wildlife and domestic animals zoonoses of major health and economic significance are presented to illustrate how knowledge of zoonoses epidemiology is essential for implementing control measures. Offered in alternate years. —W. Chomel

#### 241. Advanced Topics in Canine Genetics and Genomics (2)

Discussion—2 hours. Prerequisite: Genetics 201A, 201C (or equivalents, with consent of instructor). Limited enrollment. In-depth study of topics in canine genomics and genetics. Topics will vary annually, but can include positional cloning, whole genome association, complex traits and linkage disequilibrium. Students will lead discussions on assigned readings. May be repeated for credit when topic differs. Offered in alternate years. —S. Bannasch

#### 242. Ecological Genetics: Applied Genetics for Ecology, Health, and Conservation of Natural Populations (3)

Lecture—2 hours; discussion—0.5 hours; laboratory—0.5 hours. Prerequisite: undergraduate genetics and ecology/conservation biology courses recommended. Class size limited to 20 students; graduate students, 2nd or 3rd year veterinary students; advanced undergraduate students with consent of instructor. Introduction to the field of applied ecological genetics to include applications in conservation ecology, population genetics, population biology, wildlife health and disease ecology. (Same course as Ecology 242.)—F. (F.) Ernest

#### 243. Advanced Topics in Conservation Genetics (2)

Discussion—18 sessions; lecture—2 sessions. Prerequisite: undergraduate genetics and ecology or consent of instructor. Restricted to 16 students. In-depth study of topics related to the application of genetic tools to wildlife conservation. Topics will vary annually, but may include use of non-invasive methods of genetic assessment and monitoring of wildlife populations. Students will lead discussions on assigned readings. May be repeated for credit when topic differs. (S/U grading only.)—F. (F.) Sacks

#### 266. Applied Analytic Epidemiology (3)

Lecture—2 hours; laboratory—2 hours. Prerequisite: Preventive Veterinary Medicine 404 or consent of instructor. Principles and applications in analysis of epidemiologic data. Methods of analyzing stratified and matched data, logistic regression for cohort and case-control studies, Poisson regression, survival-time methods. (Same course as Master of Public Health 266.)—S. (S.) Kass

#### 277. Mathematical Models in Epidemiology (3)

Lecture/discussion—2 hours; laboratory—2 hours. Prerequisite: Preventive Veterinary Medicine 403 and Medicine & Epidemiology 405; consent of instructor; although not required, students are encouraged to refresh their knowledge of high school calculus and differential equations. Class size limited to 30 students. Theory of epidemics and mathematical modeling concepts for infectious diseases to include discrete and continuous time models, their use to explore disease dynamics and investigate prevention and control strategies for human and veterinary infectious diseases. (Same course as Epidemiology 277.)—S. (S.) Aly

#### 290. Seminar (1)

Seminar—1 hour. Presentation and discussion of advanced and current topics in population health and reproduction. (S/U grading only.)—F, W, S. (F, W, S.)

#### 298. Group Study (1-5)

Prerequisite: consent of instructor.—F, W, S, Su. (F, W, S, Su.)

#### 299. Research (1-12)

Prerequisite: consent of instructor. (S/U grading only.)—F, W, S. (F, W, S.)

## Surgical and Radiological Sciences (VSR)

### Lower Division

#### 99. Special Study for Undergraduates (1-5)

(P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

### Upper Division

#### 199. Special Study for Advanced Undergraduates (1-5)

(P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

### Graduate

#### 298. Group Study (1-5)

Prerequisite: consent of instructor. (S/U grading only.)—F, W, S, Su. (F, W, S, Su.)

#### 299. Research (1-12)

Prerequisite: consent of instructor. (S/U grading only.)—F, W, S, Su. (F, W, S, Su.)

## Viticulture and Enology

(College of Agricultural and Environmental Sciences)

David E. Block, Ph.D., Chairperson of the Department

**Department Office.** 1162 RMI North Building 530-752-0380; <http://wineserver.ucdavis.edu>

### Faculty

Linda F. Bisson, Ph.D., Professor

David E. Block, Ph.D., Professor

(*Viticulture and Enology, Chemical Engineering*)  
Academic Senate Distinguished Teaching Award

Roger B. Boulton, Ph.D., Professor

(*Viticulture and Enology, Chemical Engineering*)

Dario Cantù, Ph.D., Associate Professor

Susan E. Ebeler, Ph.D., Professor

Hildegarde Heymann, Ph.D., Distinguished Professor

Mark A. Matthews, Ph.D., Professor

Ron Runnebaum, Ph.D., Assistant Professor

David R. Smart, Ph.D., Associate Professor

M. Andrew Walker, Ph.D., Professor

Andrew L. Waterhouse, Ph.D., Professor

Larry E. Williams, Ph.D., Professor

### Emeriti Faculty

Douglas O. Adams, Ph.D., Professor Emeritus

L. Peter Christensen, Specialist in Cooperative Extension, Emeritus

W. Mark Kliewer, Ph.D., Professor Emeritus

Lloyd A. Lider, Ph.D., Professor Emeritus

Carole P. Meredith, Ph.D., Professor Emerita

Ann C. Noble, Ph.D., Professor Emerita

Cornelius S. Ough, D.Sc., Professor Emeritus

Vernon L. Singleton, Ph.D., Professor Emeritus

Academic Senate Distinguished Teaching Award

James A. Wolpert, Ph.D., Specialist in Cooperative Extension, Emeritus

### Affiliated Faculty

Matthew W. Fidelibus, Ph.D., Specialist in Cooperative Extension

S. Kaan Kurtural, Ph.D., Associate Specialist in Cooperative Extension

James T. Lapsley, Ph.D., Research Associate

Andrew J. McElrone, Ph.D., Associate Adjunct Professor

Jennifer L. Nelson, Ph.D., Assistant Adjunct Professor

Anita Oberholster, Ph.D., Assistant Specialist in Cooperative Extension

Kerri L. Steenwerth, Ph.D., Assistant Adjunct Professor

### The Major Program

The Viticulture and Enology major provides an interdisciplinary education in the biological and physical principles underlying grape and wine production as well as practical knowledge of grape growing (viticulture) and wine making (oenology). This program provides the knowledge base for problem-solving and decision-making in commercial grape and wine production.

**Preparatory Requirements.** Before transferring into the Viticulture and Enology major, students must complete the following courses with a grade of C- or better and with a combined grade point average of at least 2.500 at the University of California (at least

3.000 for similar courses taken at community college) for these and all other preparatory courses. In addition, students' overall UC GPA must be 2.250 or higher. All courses must be taken for a letter grade.

## UNITS

Biological Sciences 1A or 2A .....	4-5
Chemistry 2A, 2B, 2C, 8A .....	17
Mathematics 16A.....	3
Physics 1A, 1B or 7A.....	4-6

**Recommendations.** Completion of UC Davis equivalents of the following preparatory courses for the major are not required for entry but are highly recommended. Failure to complete these will delay entry into required upper division courses and may thus delay graduation. Some courses may be available at UC Davis during Summer Session:

## UNITS

Chemistry 8B .....	4
Mathematics 16B .....	3
Biological Sciences 1C or Plant Sciences 2.....	4-5
Biological Sciences 102.....	3

**The Program.** The curriculum builds upon a foundation of biology, chemistry, biochemistry and mathematics with specialized courses related to grape and wine production. To complete the program, students may choose to place particular emphasis on viticulture, enology or economics. Credit may also be earned for foreign language study and internships.

**Career Alternatives.** Graduates are qualified for a variety of vineyard and winery positions, including production management, quality control and research. Additionally they may work in related fields such as pest management, nursery production and analytical services.

**B.S. Major Requirements:**

## UNITS

**Preparatory Subject Matter ..... 44-51**

Biological Sciences 1A or 2A and 1C or Plant Sciences 2 .....	8-10
Chemistry 2A-2B-2C .....	15
Chemistry 8A, 8B .....	6
Plant Sciences 21 or equivalent and adviser approval .....	0-3
Mathematics 16A-16B .....	6
Physics 1A, 1B or 7A.....	4-6
Viticulture and Enology 2, 3 .....	5

**Depth Subject Matter ..... 48-54**

Biological Sciences 102, 103 or 105 ....	3-6
Microbiology 102, 102L or 101 .....	5-7
Plant Sciences 120 or Statistics 106 .....	4
Viticulture and Enology 101A, 101B, 101C, 110, 118 .....	15
Viticulture and Enology 123, 124, 125, 126, 128, 135 and in consultation with the adviser, choose 3 of the following courses: 123L, 124L, 125L, 126L, 128L. If more than 3 are taken, the extra courses will count as restricted electives in Area B .....	21-22

**Restricted Electives ..... 28**

In consultation with adviser, choose 28 units from three of the following five areas. At least 12 units must be from one of the following areas: (A) Plant Science, (B) Food Science and Microbiology, or (C) Economics and Business.

(A) **Plant Science area:** Applied Biological Systems Technology 142, 145, 147, 175, 180, Atmospheric Science 133, Biological Sciences 101, Biotechnology 160, Entomology 110, Hydrologic Science 110, 124, Molecular and Cellular Biology 126, Nematology 100, Plant Biology 111, 112, 123, 143, 172, 172L, Plant Pathology 120, Plant Sciences 142, 146, 154, 157, 158, 171, 176, Soil Science 100, 102, 109, 118, Viticulture and Enology 111. (B) **Food Science and Microbiology area:** Biological Sciences 101, Food Science and Technology 102A, 102B, 104, 104L, 108, 109, 110A, 110B, 127, Microbiology

140, 150, 155L, Viticulture and Enology 140.

(C) **Economics and Business area:**

Agricultural and Resource Economics 100A, 112, 113, 118, 130, 140, 150,

Economics 1A, 1B, Management 11A, 11B, Viticulture and Enology 111, 130

(D) **Language area:** Maximum 12 units, not counting course 1, of one of the following languages: French, German, Italian, Portuguese or Spanish. At least one course must be Intermediate or Conversational; qualifying Intermediate or Conversational courses are listed below:

French 8, 21, 22, 23, 38, German 6, 11, 20, 21, 22, Italian 4, 5, Spanish 8, 21, 22, 28, 31, 32, 33.

Courses taught in English will not count as restricted electives in this major.

(E) **Internship area:** A maximum of eight units of Viticulture and Enology 190X, 192, 198, 199, 290 or 298 may be counted as restricted electives by prior arrangement with adviser. May be increased to 12 units in exceptional circumstances.

**Total Units for the Major ..... 120-133****Major Adviser.** L. Bisson, A. Walker**Related Major Programs.** Food Science and Technology, and Plant Sciences.

**Graduate Study.** Several graduate groups offer programs of study leading to advanced degrees in the fields of viticulture and enology. For the M.S. or Ph.D. degree, see *Agricultural and Environmental Chemistry* (A Graduate Group), on page 151, *Engineering: Chemical Engineering*, on page 276, *Ecology* (A Graduate Group), on page 250, *Food Science* (A Graduate Group), on page 340, *Integrative Genetics and Genomics* (A Graduate Group), on page 380, *Horticulture and Agronomy* (A Graduate Group), on page 369, *Microbiology* (A Graduate Group), on page 458, *Plant Biology* (A Graduate Group), on page 511, *Plant Pathology*, on page 513, *Soils and Biogeochemistry* (A Graduate Group), on page 552, and *Viticulture and Enology* (A Graduate Group), on page 586.

**Courses in Viticulture and Enology (VEN)****Lower Division****2. Introduction to Viticulture (2)**

Lecture—2 hours. Fundamental principles of biology and culture of the grapevine including taxonomy, morphology, physiology, distribution, domestication, utilization, propagation, production systems, harvesting, and storage and processing of grapes. Successful completion of the course should prepare students for upper division courses in viticulture. GE credit: SE.—F. (F.) Cantu

**3. Introduction to Winemaking (3)**

Lecture—3 hours. Overview of the history of wine, viticulture, fermentation, winery operations, the physiology of wine consumption, wines produced in California and other major wine-producing regions and the sensory evaluation of wine. GE credit: SE, SS.—F, W, S. (F, W, S.) Heymann, Waterhouse

**90X. Lower Division Seminar (2)**

Seminar—1 hour; term paper (required)/discussion. Prerequisite: lower division standing and consent of instructor. Introduction to current issues surrounding wine and health as they relate to diet, nutrition, and toxicology. May not be repeated for credit. GE credit: Wrt.

**99. Special Study for Undergraduates (1-5) (P/NP grading only.)****Upper Division****101A. Viticultural Practices (3)**

Lecture—1.5 hours; discussion/laboratory—3.5 hours. Prerequisite: course 2. Identification, cultivation, and use of the major wine, table, raisin, and rootstock cultivars. Includes practices specific to the

fall such as fruit contracts, maturity sampling, harvesting, cover crops, and soil-pests. One field trip required. GE credit: SE.—F. (F.) Walker

**101B. Viticultural Practices (3)**

Lecture—1.5 hours; discussion/laboratory—3.5 hours. Prerequisite: course 2. Theory, principles, and practices of pruning and grapevine propagation. Plant materials and the certification process, weed control and weed identification, wood diseases, and frost protection. One field trip required. GE credit: SE.—W. (W.) Walker

**101C. Viticultural Practices (3)**

Lecture—1.5 hours; discussion/laboratory—3.5 hours. Prerequisite: course 2. Field oriented experience in the principles and practices of grapevine production, including vineyard establishment, vine training, trellising, canopy management practices, irrigation and water management, and methods of crop adjustment for improvement of fruit quality. One field trip required. GE credit: SciEng | SE.—S. (S.) Smart

**110. Grapevine Growth and Physiology (3)**

Lecture—3 hours. Prerequisite: course 2. Botanical aspects including morphology and domestication will precede lectures covering flower development and energy budget concepts. Impact of physiological variables such as photosynthesis translocation, mineral nutrition, and water relations on fruit ripening and composition will be covered. GE credit: SciEng | SE.—W. (W.) Matthews

**111. World Viticulture (3)**

Lecture—3 hours. Prerequisite: upper division standing. Study of the diversity of viticulture, both geographical and historical. History of grape growing and its spread throughout the world will be covered, along with discussions of current viticultural practices in different parts of the world, including California. GE credit: SciEng | OL, SE, WE.—S. (S.) Heymann

**111L. Critical Evaluation of Wines of the World (1)**

Laboratory/discussion—3 hours. Prerequisite: course 111 (must be taken concurrently), course 125 with a grade of C or better. Critical analysis of wines produced in different parts of the world with emphasis on the relationship between sensory properties of the wines and factors associated with their place of origin. (P/NP grading only.) GE credit: SE.—S. (S.) Heymann

**115. Raisin and Table Grape Production (2)**

Lecture—2 hours. Prerequisite: course 2. Overview of the raisin and table grape industries in California and other production areas of the world. Cultural practices associated with raisin and table grape production will also be discussed. GE credit: SciEng | SE.—S. (S.) Williams

**118. Grapevine Pests, Diseases and Disorders (3)**

Lecture—3 hours. Prerequisite: course 2. Various pests and diseases of vineyards throughout California. Pest/disease identification and control methods (to include sampling techniques) also will be discussed. Integrated management approach to pest control methods will be emphasized. GE credit: SciEng | SE.—F. (F.) Cantu

**123. Analysis of Musts and Wines (2)**

Lecture—2 hours. Prerequisite: Chemistry 2C and 8B or equivalent; Agricultural Management and Rangeland Resources 21 or equivalent. Students enrolled in the lecture only portion of the course will be required to enroll in 1 unit of course 199/299. Fundamental principles of analytical chemistry as they relate to specific methods used in winemaking. GE credit: SciEng | SE.—F. (F.) Waterhouse

**123L. Analysis of Musts & Wines Laboratory (2)**

Lab—3 hours; independent study—3 hours. Prerequisite: Chemistry 2C and 8B, or equivalent, Agricultural Management and Rangeland Resources 21, and course 123 (course 123 may be taken concurrently). Restricted to upper division and graduate students in Viticulture & Enology; others by approval of instructor. Fundamental principles of analytical chem-

istry as they relate to specific methods used in wine-making. Laboratory exercises demonstrating various chemical, physical and biochemical methods. Data will be analyzed and results interpreted in weekly lab reports; includes student-designed independent project and written report. GE credit: SciEng, Wrt | QL, SE, VL, WE.—F. (F.) Waterhouse

#### **124. Wine Production (2)**

Lecture—2 hours. Prerequisite: course 3, 123 (may be taken concurrently), Biological Sciences 102. Principles and practices of making standard types of wines, with special reference to grape varieties used and methods of vinification. SciEng | GE credit: SE, WE.—F. (F.) Bisson

#### **124L. Wine Production Laboratory (3)**

Laboratory—3 hours; independent study—3 hours; term paper. Prerequisite: course 124 (may be taken concurrently). Restricted to undergraduate students in fermentation science, viticulture and enology, biotechnology, microbiology, food science and applied plant biology or graduate students in food science, agricultural and environmental chemistry and horticulture. Current technologies used in production of California table wines; analysis and monitoring of impact of fermentation variables on microbial performance and product quality; student-designed independent research project. GE credit: SciEng | OL, SE, WE.—F. (F.) Bisson

#### **125. Wine Types and Sensory Evaluation (2)**

Lecture—2 hours. Prerequisite: course 124; Plant Sciences 120 or Statistics 106. Open to upper division and graduate students in Viticulture & Enology; others by approval of instructor. Principles of sensory evaluation and application to wines. Factors influencing wine flavor, data from sensory analysis of model solutions. GE credit: SciEng | QL, SE.—S. (S.) Heymann

#### **125L. Sensory Evaluation of Wine Laboratory (2)**

Laboratory—3 hours; term paper. Prerequisite: course 125 (may be taken concurrently). Restricted to upper division majors in fermentation science or viticulture and enology or graduate students in food science. Sensory evaluation of wines and model systems using discrimination tests, ranking, descriptive analysis and time-intensity analysis. Data analyzed by appropriate statistical tests and results interpreted in extensive weekly lab reports. GE credit: SciEng | QL, SE, VL, WE.—S. (S.) Heymann

#### **126. Wine Stability (3)**

Lecture—2 hours; discussion—1 hour. Prerequisite: course 124. Restricted to students in viticulture and enology, fermentation science, applied plant biology majors, or graduate students in food science, microbiology, horticulture, and horticulture and agronomy. Principles of equilibria and rates of physical and chemical reactions in wines; treatment of unstable components in wines by absorption, ion exchange, refrigeration, filtration, and membrane processes; and protein, polysaccharide, tartrate, oxidative, and color stabilities. GE credit: SciEng | SE.—W. (W.) Runnebaum

#### **126L. Wine Stability Laboratory (2)**

Laboratory—3 hours; independent study—3 hours. Prerequisite: course 126 (may be taken concurrently); consent of instructor. Restricted to upper division fermentation science, viticulture and enology majors, or graduate students in food science, agricultural and environmental chemistry, microbiology or by consent of instructor. Practical application of principles of equilibria and rates of physical and chemical reactions to wine stability. GE credit: SciEng | SE, WE.—W. (W.) Runnebaum

#### **128. Wine Microbiology (2)**

Lecture—2 hours. Prerequisite: courses 123 and 124; Microbiology 102 and 102L, or Food Science and Technology 104 and 104L; courses 125 and 126 recommended. Nature, development, physiology, biochemistry, and control of yeasts and bacteria involved in the making, aging and spoilage of wine. GE credit: SciEng | SE.—W. (W.) Bisson

#### **128L. Wine Microbiology Laboratory (2)**

Laboratory—6 hours. Prerequisite: course 123, 124, and 128 (may be taken concurrently), Microbiology 102L or Food Science and Technology 104 and 104L; course 125 and 126 recommended.

Restricted to upper division students in fermentation science, viticulture and enology or graduate students in food science. Nature, development, physiology, biochemistry and control of yeasts and bacteria involved in the making, aging and spoilage of wine. GE credit: SciEng | SE, VL, WE.—W. (W.) Bisson

#### **135. Wine Technology and Winery Systems (5)**

Lecture—3 hours; discussion/laboratory—2 hours. Prerequisite: course 124. Process technologies and process systems that are used in modern commercial wineries. Lectures, demonstrations, problem solving sessions, and possible field trips. Includes grape preparation and fermentation equipment; post-fermentation processing equipment; winery utilities, cleaning systems, and waste treatment. GE credit: SciEng | SE.—S. (S.) Block

#### **140. Distilled Beverage Technology (3)**

Lecture—3 hours. Prerequisite: Chemistry 8B; Food Science and Technology 110A. Distillation principles and practices; production technology of brandy, whiskey, rum, vodka, gin, and other distilled beverages; characteristics of raw materials, fermentation, distillation, and aging. Offered in alternate years. GE credit: SciEng | QL, SE.—(S.) Boulton

#### **181. Readings in Enology (1)**

Discussion—1 hour. Prerequisite: course 3. Critical evaluation of selected monographs in enology. Discussion leadership rotates among the students. May be repeated three times for credit. (P/NP grading only.) GE credit: SE.—S. (S.) Matthews

#### **190X. Winemaking Seminar (1)**

Seminar—1 hour; discussion—1 hour. Prerequisite: course 3. Open to Viticulture and Enology majors and graduate students. Outside speakers on a specific winemaking topic chosen for the quarter. Discussion with the speaker hosted by the faculty member(s) in charge. May be repeated three times for credit. (P/NP grading only.) GE credit: SE.—S. (S.)

#### **192. Internship (1-12)**

Internship—3-36 hours. Prerequisite: completion of 84 units. Work experience related to Fermentation Science (Enology) or Plant Science (Viticulture) majors. Internships must be approved and supervised by a member of the department or major faculty, but are arranged by the student. (P/NP grading only.) GE credit: SE.

#### **198. Directed Group Study (1-5)**

Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S. (F, W, S.)

#### **199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.) GE credit: SE.

#### **Graduate**

#### **200. Introduction to Scientific Methods (2)**

Lecture/discussion—1 hour; term paper. Prerequisite: graduate standing or consent of instructor. Processes involved in conducting scientific research. Topics include conducting literature review, formulating hypotheses, and analyzing and reporting results. Annotated bibliography and written and oral research proposal.

#### **210. Grape Development and Composition (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 102 and 103, or 105. Anatomy, physiology and biochemistry of grape berry development, with emphasis on the development of grape composition relevant to winemaking. Offered in alternate years.—S. Adams, Polito

#### **213. Flavor Chemistry of Foods and Beverages (3)**

Lecture/discussion—3 hours. Prerequisite: Chemistry 8B, course 123, course 123L or Food Science and Technology 103 or consent of instructors. Students

will become familiar with basic principles of flavor chemistry, analysis, and formation in fresh and processed foods. Students will be required to read and critically evaluate flavor chemistry literature. (Same course as Food Science and Technology 213).—S. (S.) Ebeler, Heymann

#### **215. Sensometrics (3)**

Lecture—3 hours. Prerequisite: Food Science and Technology 117 or the equivalent, course 125 and 125L or Food Science and Technology 107A or 107B. Experimental design and statistical analysis, including multivariate analysis, for both sensory and instrumental data in enology and food-related studies.—F. (F.) Heymann

#### **216. Sustainable Vineyard Development (5)**

Lecture/discussion—3 hours; fieldwork—3 hours; term paper. Prerequisite: course 101A, 101B, 101C, and one of courses 115 and 118 or consent of instructor; course 110, Soil Science 100, Atmospheric Science 133 and Agricultural and Resource Economics 140 recommended. Application of plant, meteorological, soil, water, GIS, and economic sciences to sustainable vineyard development. Preparation of a comprehensive study to determine the viticultural and economic feasibility of a given site for raisin, table, or wine grape production.—F. (F.) Smart

#### **217. Field and GIS Evaluation of Soils (3)**

Lecture/laboratory—4 hours; fieldwork—3 hours. Prerequisite: Plant Sciences 120, 205 or 206; Soil Science 100, 105, or 107; course 101C; Applied Biotechnology 180 are recommended; consent of Instructor. Principles and practices used to evaluate agricultural soils in the field, including soil pits, soil cores, electrical conductivity meters, ground penetrating radar, geomorphology and surface terrain analysis. Use of geographic information sciences, soil databases, digital elevation models and geostatistics. Offered in alternate years.—(W.) Smart

#### **219. Natural Products of Wine (3)**

Lecture—3 hours. Prerequisite: courses 123 and 124, or natural products background and consent of instructor. Structure, occurrence, and changes due to wine production to the natural products found in wine. Chemicals with a sensory impact will be emphasized, including flavonoids and other phenolics, terpenes and norisoprenoids, pyrazines, oak volatiles and other wine constituents.—F. (F.) Waterhouse

#### **223. Instrumental Analysis of Must and Wine (4)**

Lecture—2 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 123 or Food Science and Technology 103 required. Biological Sciences 102 and 103 or Biological Sciences 105, Chemistry 107B or Chemistry 115 recommended. Open to upper division students in Viticulture & Enology, Food Science and Technology; students in Food Science, Ag & Environmental Chemistry and Viticulture & Enology graduate groups. Theory and practice of instrumental analysis of wines and musts. Emphasis on the principles of analytical techniques (e.g., CE, GC, HPLC, Mass Spectrometry) and factors determining correct choice of instrumental method.—S. (S.) Ebeler

#### **224. Advances in the Science of Winemaking (3)**

Lecture—3 hours. Prerequisite: course 125, 126 and graduate standing or consent of instructor. Selected topics in the science and technology of winemaking. Topics drawn from current research of participating faculty. Critical analysis of the technical content of published material.—S. (S.)

#### **225. Advanced Sensory Analysis of Wines (3)**

Lecture/discussion—2 hours; laboratory—4 hours. Prerequisite: courses 124 and 125 (or Food Science and Technology 107) and Agricultural Management and Rangeland Resources 120 or the equivalent. Sensory descriptive analysis experiments will be designed and conducted using standard sensory science methods. Data will be analyzed by analyses of

variance, principal component analyses and generalized Procrustes analysis to evaluate the judge's performance and interpret the significance of the results. —S. Heymann

### **235. Winery Design (4)**

Lecture—2 hours; discussion—1 hour; independent study. Prerequisite: course 124, 135 or consent of instructor. Design of wineries. Includes process calculations, equipment selection, process layout and building choice and siting. Project scheduling, capital costs, and ten-year cash flow analysis for the winery. One field trip required. Offered in alternate years. —W. Boulton

### **270. Critical Evaluation of Scientific Literature (2)**

Discussion—2 hours. Prerequisite: consent of instructor. Contemporary research topics in biological sciences. Discussion of recent research articles in a special topic area. Intended to develop skills in critical evaluation of scientific publications. May be repeated for credit. (S/U grading only.)—F, S. (F, S.) Bisson

### **290. Seminar (1)**

Seminar—1 hour. Prerequisite: consent of instructor. (S/U grading only.)—F, S. (F, S.)

### **290C. Advanced Research Conference (1)**

Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Planning and results of research programs, proposals, and experiments. Discussion and critical evaluation of original research being conducted by the group. Discussion led by individual research instructors for research group. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

### **291. Advanced Viticulture (2)**

Lecture/discussion—2 hours. Prerequisite: course 110, 116, 124, 125; course 210 recommended.

Critical evaluation of scientific and popular literature on selected topics of current interest that relate viticulture to fruit or wine sensory attributes or quality. May be repeated one time for credit. Offered in alternate years. —(W.) Matthews

### **292. Advanced Internship (1-15)**

Internship—3-45 hours. Prerequisite: courses 123, 123L, 124, 124L, 125, 125L, 126, 126L, 128, 128L; consent of instructor. Restricted to Viticulture & Enology Graduate Group graduate students. Work experience related to Fermentation Science (Enology) or Plant Science (Viticulture) majors. Internships must be approved and supervised by a graduate group faculty member or students major professor, but are arranged by the student. May be repeated 15 units for credit. (S/U grading only.)—F, W, S. (F, W, S.)

### **297T. Tutoring in Viticulture and Enology (1-5)**

Prerequisite: graduate standing and consent of instructor. Designed for graduate students who desire teaching experience, but are not teaching assistants. Student contact primarily in laboratory or discussion sections, and under direction of a faculty member. (S/U grading only.)

### **298. Group Study (1-5)**

(S/U grading only.)

### **299. Research (1-12)**

(S/U grading only.)

## **Professional**

### **396. Teaching Assistant Training Practicum (1-4)**

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.) F, W, S. (F, W, S.)

## **Viticulture and Enology (A Graduate Group)**

Andrew L. Waterhouse, Ph.D., Chairperson of the Group

**Group Office.** 1204 RMI South  
530-752-1852; Fax 530-7582-032;  
<http://vengg.ucdavis.edu>

## **Faculty**

Douglas O. Adams, Ph.D., Professor (*Viticulture and Enology*)  
Charles W. Bamforth, Ph.D., Professor (*Food Science and Technology*)  
Linda F. Bisson, Ph.D., Professor (*Viticulture and Enology*)  
David E. Block, Ph.D., Professor (*Viticulture and Enology, Chemical Engineering*, Academic Senate Distinguished Teaching Award)  
Roger B. Boulton, Ph.D., Professor (*Viticulture and Enology, Chemical Engineering*)  
Dario Cantú, Ph.D., Associate Professor (*Viticulture and Enology*)  
Susan E. Ebeler, Ph.D., Professor (*Viticulture and Enology*)  
Jean-Xavier Guinard, Ph.D., Professor (*Food Science and Technology*)  
Hildegarde Heymann, Ph.D., Professor (*Viticulture and Enology*)  
Maria Marco, Ph.D., Associate Professor (*Food Science and Technology*)  
Mark A. Matthews, Ph.D., Professor (*Viticulture and Enology*)  
David A. Mills, Ph.D., Professor (*Viticulture and Enology, Food Science and Technology*)  
Kenneth A. Shackel, Ph.D., Professor (*Plant Sciences*)  
David R. Smart, Ph.D., Professor (*Viticulture and Enology*)  
Li Tian, Ph.D., Associate Professor (*Plant Sciences*)  
M. Andrew Walker, Ph.D., Professor (*Viticulture and Enology*)  
Andrew L. Waterhouse, Ph.D., Professor (*Viticulture and Enology*)  
Larry E. Williams, Ph.D., Professor (*Viticulture and Enology*)

## **Affiliated Faculty**

Matthew W. Fidelibus, Ph.D., Associate Specialist in Cooperative Extension (*Viticulture and Enology*)  
W. Douglas Gubler, Ph.D., Specialist in Cooperative Extension (*Plant Pathology*)  
Andrew J. McElrone, Ph.D., Assistant Adjunct Professor (*Viticulture and Enology*)  
Jean-Jacques Lambert, Ph.D., Assistant Research Soil Scientist (*Viticulture & Enology*)  
Anita Oberholster, Ph.D., Assistant Specialist in Cooperative Extension (*Viticulture and Enology*)  
Kerri L. Steenwerth, Ph.D., Assistant Adjunct Professor (*Viticulture and Enology*)

**Graduate Study.** The M.S. program offers advanced studies in viticulture and enology, ranging from the genetics, physiology and biochemistry of grapevines to the chemistry, microbiology and sensory science of wines and the chemical engineering of winemaking. Applications must be submitted online by January 15.

Ph.D. studies are not offered by the Graduate Program in Viticulture and Enology.

**Preparation.** Applicants to the program are required to have a level of competence equivalent to that of a strong science undergraduate program. This includes coursework in biology, general chemistry, organic chemistry, calculus, statistics (analysis of variance), biochemistry, microbiology, and economics.

Specific requirements are outlined in detail and may be obtained by visiting <http://vengg.ucdavis.edu>.

**Graduate Advisers.** L.F. Bisson, D. Cantú

## **War-Peace Studies**

(College of Letters and Science)

The interdisciplinary minor in War-Peace Studies examines the causes and dynamics of intra- and international wars and efforts to prevent and settle such conflicts.

Students in the minor are encouraged to participate in the educational activities of the Davis Program of the UC Institute on Global Conflict and Cooperation (IGCC).

The minor is sponsored by the International Relations Program.

## **Minor Program Requirements:**

UNITS

**War-Peace Studies ..... 19-20**

One or two courses from each of the following areas:

**Approaches:** Anthropology 123AN, 126B, Comparative Literature 157, Philosophy 115, 118, Political Science 121, 123, 124, 132, 176, Sociology 157, Women's Studies 102

**Northern and Western Regions:** History 134A, 138C, 142A, 143, 144A, 144B, 145, 170B, 171B, 174B, Native American Studies 130B, Political Science 130, 131

**Southern and Eastern Regions:** Anthropology 142, 143A, 143B, 144, History 165, 191F, 194C, Native American Studies 120, Political Science 142A

**Restriction.** No more than two courses from a single department may be offered in satisfaction of the minor requirements.

**Advising.** International Relations Program 530-754-8098

## **Water Science**

See **Hydrologic Sciences (A Graduate Group), on page 375; Hydrology, on page 376; and Soil and Water Science, on page 551.**

## **Wildlife, Fish, and Conservation Biology**

(College of Agricultural and Environmental Sciences)

John M. Eadie, Ph.D., Chairperson of the Department

**Department Office.** 1086 Academic Surge 530-754-9796; <http://wfcb.ucdavis.edu>

## **Faculty**

Louis W. Botsford, Ph.D., Professor  
Tim Caro, Ph.D., Professor  
John M. Eadie, Ph.D., Professor  
Nann A. Fangue, Ph.D., Associate Professor  
Douglas A. Kelt, Ph.D., Professor  
Brian D. Todd, Ph.D., Associate Professor  
Dirk H. Van Vuren, Ph.D., Professor

## **Emeriti Faculty**

Daniel W. Anderson, Ph.D., Professor Emeritus  
Joseph J. Cech, Jr., Ph.D., Professor Emeritus  
Christopher M. Dewees, Ph.D., Specialist in Cooperative Extension Emeritus  
Deborah L. Elliott-Fisk, Ph.D., Senior Lecturer Emerita  
Don C. Erman, Ph.D., Professor Emeritus  
Nancy A. Erman, M.S., Specialist Emerita  
E. Lee Fitzhugh, Ph.D., Specialist in Cooperative Extension Emeritus  
Walter E. Howard, Ph.D., Professor Emeritus  
Rex E. Marsh, A.B., Specialist Emeritus

Peter B. Moyle, Ph.D., Distinguished Professor  
Emeritus  
Terrell P. Salmon, Ph.D., Specialist in Cooperative Extension Emeritus

### Affiliated Faculty

Roger A. Baldwin, Ph.D., Associate Specialist in Cooperative Extension  
A. Peter Klimley, Ph.D., Adjunct Professor  
A. Keith Miles, Ph.D., Adjunct Professor

### The Major Program

The Wildlife, Fish, and Conservation Biology major deals with the relationships between the requirements of wildlife and the needs of people. Understanding these relationships is vital for the maintenance of ecological diversity, recreational resources, and food supplies. Students completing the major possess a broad knowledge of ecology and natural history, but with the quantitative skills to use this knowledge in critical thinking and decision-making.

**The Program.** The major emphasizes broad training in biological sciences, with specialization in one of four areas. The major is designed primarily for students interested in becoming professionals in the diverse fields of wildlife, fish, and conservation biology, including veterinary and wildlife health sciences. The breadth of course requirements, when combined with electives, also make this an excellent preparatory major for secondary school teaching. Certification by professional societies such as The Wildlife Society, American Fisheries Society, or the Ecological Society of America, or preparation for graduate studies may also be achieved by careful planning of electives with a faculty adviser.

**Career Alternatives.** The major prepares students to excel in the dynamic fields of environmental and conservation biology, emphasizing vertebrate animals—both native and invasive—in their natural environments, as well as resolution of conflicts between humans and wild animals. Positions now held by graduates of this major include wildlife biology, fisheries biology, wildlife damage management, and resource biologists and managers with local, state, and federal agencies, biologists or consultants with private industries such as environmental consulting firms, commercial fishing businesses, electrical utilities, sporting clubs or businesses, and aquaculture operations, as well as veterinarians, medical physicians, and professors/researchers who teach and/or conduct research in academic institutions.

### B.S. Major Requirements:

UNITS

#### Written/Oral Expression ..... 7-8

University Writing Program 1 ..... 4  
Communication 1, 3 or Dramatic  
Art 10 ..... 3-4  
Completing University Writing Program 1 and Communication 1 will simultaneously satisfy the College requirements.

#### Preparatory Subject Matter ..... 50-51

Biological Sciences 2A, 2B, 2C ..... 15  
Chemistry 2A, 2B, 8A, 8B ..... 16  
Mathematics 16A, 16B ..... 6  
Physics 1A, 1B ..... 6  
Statistics 100, 102, or Plant Sciences 120 ..... 4  
Wildlife, Fish, and Conservation Biology 10, 11, or 50 ..... 3-4

#### Depth Subject Matter ..... 45-50

Students graduating with this major are required to attain at least a C average (2.000) in all courses taken at the university in depth and area of specialization subject matter.  
Environmental Science and Policy 100 or Evolution and Ecology 101 ..... 4  
Evolution and Ecology 100 ..... 4  
Biological Sciences 101 ..... 4

Wildlife, Fish, and Conservation Biology 121 or 130.....	4
Neurobiology, Physiology, and Behavior 102 or Wildlife, Fish, and Conservation Biology 141.....	3-4
Wildlife, Fish, and Conservation Biology 122.....	4
Wildlife, Fish, and Conservation Biology 154.....	4
Choose three lecture courses and two (laboratory) courses from: Wildlife, Fish, and Conservation Biology 110, (110L), 111, (111L), 120, (120L), or 134, (134L). 14-15	
Wildlife, Fish, and Conservation Biology 100, or 101 & 101L, or 102 & 102L....	4-7
Strongly recommended, but not required, Statistics 104, 106, or 108 .....	4
Strongly recommended, but not required, Landscape Architecture 150 .....	3
Strongly recommended, but not required, Anatomy, Physiology and Cell Biology 100.....	4

#### Restricted Electives ..... 12-24

Choose one from the four Areas of Specialization shown below. No course can be used to simultaneously satisfy the Depth Subject Matter and the Area of Specialization.

#### Areas of Specialization

(1) *Wildlife and Conservation Biology:* Complete Wildlife, Fish, and Conservation Biology 151.

Choose one course from: Plant Sciences 102, 131, 144, 147 & 147L, 178, Plant Biology 102, 108, 117, 119, 148.

Choose one course from: Wildlife, Fish, and Conservation Biology 110, 111, 120, 134, 136, 141, 144, 152, 155 & 155L, 156, 157 or 160.

Choose one course from: Animal Science 103, 104, 170, Environmental Horticulture 160, Entomology 156, Environmental Science and Policy 121, 127, 155, 161, 162, 166N, 170, 171, Evolution and Ecology 107, 115, 138, 147, Environmental Toxicology 101, Plant Sciences 130, 135, or 162.

Note: Students interested in certification as a Wildlife Biologist from The Wildlife Society should consider additional courses in plant sciences.

(2) *Fish Biology:* Complete Wildlife, Fish, and Conservation Biology 120 & 120L.

Choose one course from: Entomology 116, Evolution and Ecology 112 & 112L or 114. Choose three courses including at least one course from each of the following two groups:

(a) Aquatic Systems  
Animal Science 118, Environmental Science and Policy 116N, 150C, 151, 151L, 152, 155, Evolution and Ecology 115, Environmental Science and Management 100, Hydrology 143, Wildlife, Fish, and Conservation Biology 144, 155 & 155L, 157, or 160.

(b) Water Policy/Law  
Choose one course from: Hydrology 150, Environmental Science and Policy 161, 162, 166N or 169.

(3) *Wildlife Health:* Complete Wildlife, Fish, and Conservation Biology 151.

Complete either Biological Sciences 102 and 103 or Animal Biology 102 and 103.

Choose one course from: Wildlife, Fish, and Conservation Biology 110, 111, 120, 134, 136, 141, 144, 152, 155 & 155L or 160. Choose one course from: Animal Science 103, 104, 170, Anatomy, Physiology, and Cell Biology 100, Microbiology 101, 104 Molecular and Cell Biology 150, Neurobiology, Physiology, and Behavior 101, 140, or Veterinary Medicine and Epidemiology 158.

Note that this AOS recommends additional preparatory courses; prerequisites for admission to Veterinary Medicine vary

among schools and students should confirm the specific requirements of the school(s) to which they wish to apply.

Additional Preparatory (recommended, not required): Chemistry 2C, 118A, 118B, 118C, Physics 7A, 7B, 7C.

(4) *Individualized:* Students may, with prior approval of their adviser and the curriculum committee, design their own individualized specialization within the major. The specialization will consist of at least four upper division courses with a common theme.

#### Total Units for the Degree ..... 114-133

#### Major Adviser. N.A. Fangue

Students transferring to UC Davis from another institution or new students declaring the major of Wildlife, Fish, and Conservation Biology must consult the Master Adviser so that their program can be evaluated and a faculty adviser assigned. Contact the Department in 1086 Academic Surge Building or telephone 530-754-9796.

#### Minor Program Requirements:

The minor in Wildlife, Fish, and Conservation Biology is designed for students interested in basic training and understanding of the ecology and conservation of wild terrestrial and aquatic vertebrates, emphasizing birds, mammals, amphibians, reptiles, and fish, but with relevance and application to all life forms.

UNITS

#### Wildlife, Fish, and Conservation Biology ..... 20-31

Wildlife, Fish, and Conservation Biology 100, 151, and 154, and one course from: 110, 111, 120 or 134..... 15  
Two to four upper division elective courses chosen from the Wildlife, Fish, and Conservation Biology curriculum, excluding Wildlife, Fish, and Conservation Biology 190, 191, 192, 195, 197T, 198, & 199 ..... 5-16

#### Minor Adviser. N.A. Fangue

**Graduate Study.** Faculty in Wildlife, Fish, and Conservation Biology are active members of several graduate programs, including the Ecology, Population Biology, Genetics, Animal Behavior, and Avian Science graduate groups. Students interested in graduate studies should see [Graduate Studies](#), on page 120.

#### Courses in Wildlife, Fish, and Conservation Biology (WFC)

##### Lower Division

###### 10. Wildlife Ecology and Conservation (4)

Lecture—3 hours; discussion—1 hour. Introduction to the ecology and conservation of vertebrates. Complexity and severity of world problems in conserving biological diversity. GE credit: SciEng, Div, Wrt | SE, Sl, WE.—F. S. (F. S.) Fangue, Kelt

###### 11. Introduction to Conservation Biology (3)

Lecture—3 hours. Introduction to conservation biology and background to the biological issues and controversies surrounding loss of species and habitats for students with no background in biological sciences. Offered in alternate years. GE credit: SciEng, Wrt | SE, Sl, WE.—S. Caro

###### 50. Natural History of California's Wild Vertebrates (3)

Lecture—2 hours; discussion—1 hour. Examination of the natural history of California's wild vertebrates (fish, amphibians, reptiles, birds, and mammals), including their biogeography, systematics, ecology and conservation status. GE credit: SciEng, Wrt | SE, Sl, WE.—W. (W.)

###### 51. Introduction to Conservation Biology (3)

Lecture—3 hours. Introduction to conservation biology including both biological and social issues related to the loss of species and habitats. Intended for students with no background in biological sciences. GE credit: SciEng, Wrt | SE, Sl, WE.—S. (S.) Caro

**92. Internship (1-6)**

Internship—3-18 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in all subject areas offered in the department. Internships supervised by a member of the faculty. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5)**

Prerequisite: consent of instructor. Special study for undergraduates. (P/NP grading only.)—F, W, S. (F, W, S.)

**Upper Division****100. Field Methods in Wildlife, Fish, and Conservation Biology (4)**

Lecture—2 hours; laboratory—3 hours; fieldwork—3 hours. Prerequisite: Biological Sciences 2A-2C; Evolution and Ecology 101 or Environmental Science and Policy 100 or equivalent course (can be taken concurrently) and consent of instructor. Introduction to field methods for monitoring and studying wild vertebrates and their habitats, with an emphasis on ecology and conservation. Required weekend field trips. GE credit: SciEng | SE.—S. (S.) Eadie, Kelt, Van Vuren

**101. Field Research in Wildlife Ecology (2)**

Lecture/discussion—2 hours. Prerequisite: consent of instructor, and one upper division course in each of ecology, statistics, and either ornithology, mammalogy, or herpetology. Field research in ecology of wild vertebrates in terrestrial environments; formulation of testable hypotheses, study design, introduction to research methodology, oral and written presentation of results. Offered in alternate years. GE credit: SciEng | Wrt | SE, VL, WE.—F. Eadie, Kelt, Todd, Van Vuren

**101L. Field Research in Wildlife Ecology: Laboratory (4)**

Lecture/discussion—2 hours; field work—15 hours. Prerequisite: course 101 (may be taken concurrently) and consent of instructor. Limited enrollment. Field research in ecology of wild vertebrates in terrestrial environments; testing ecological hypotheses through field research, application of research methodology, supervised independent research projects. Held between Labor Day and fall quarter. Offered in alternate years.—F. Eadie, Kelt, Todd, Van Vuren

**102. Field Studies in Fish Biology (1)**

Lecture/discussion—1 hour. Prerequisite: upper division course in each of ecology, aquatic biology, fish biology, and statistics, and consent of instructor. Emphasis on theory of quantitative fish capture methods and design of individual research projects on ecology, behavior, physiology or population biology of fishes. Offered irregularly.—S. (S.)

**102L. Field Studies in Fish Biology: Laboratory (6)**

Fieldwork—15 hours; laboratory—12 hours; discussion/laboratory—3 hours. Prerequisite: course 102 (may be taken concurrently) and consent of instructor. Field investigations of fish biology are emphasized including quantitative capture methods and individual research projects on ecology, behavior, physiology or population biology of fishes at the field site in relation to their habitats. Offered irregularly. (Deferred grading only, pending completion of projects.) GE credit: SciEng, Wrt | SE, WE.—S. (S.)

**110. Biology and Conservation of Wild Mammals (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 2A-2C; Evolution and Ecology 101 or Environmental Science and Policy 100 or equivalent course, can be taken concurrently. Origins, evolution, diversification, and geographical and ecological distributions of mammals. Morphological, physiological, reproductive, and behavioral adaptations of mammals to their environment.—S. (S.) Kelt

**110L. Laboratory in Biology and Conservation of Wild Mammals (3)**

Laboratory—6 hours. Prerequisite: course 110 (can be concurrent) and consent of instructor. Limited enrollment. Laboratory exercises in the morphology,

systematics, species identification, anatomy, and adaptations of wild mammals to different habitats.—S. (S.) Kelt

**111. Biology and Conservation of Wild Birds (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 2A-2C; upper division ecology course recommended. Phylogeny, distribution, migration, reproduction, population dynamics, behavior and physiological ecology of wild birds. Emphasis on adaptations to environments, species interactions, management, and conservation. GE credit: SciEng | SE.—F. (F.) Eadie

**111L. Laboratory in Biology and Conservation of Wild Birds (3)**

Laboratory—6 hours; fieldwork—3 hours. Prerequisite: course 111 (can be concurrent); consent of instructor. Limited enrollment. Laboratory exercises in bird species identification, anatomy, molts, age and sex, specialized adaptations, behavior, research, with emphasis on conservation of wild birds. Several weekend field trips, after class bird walks, and independent bird study are required.—F. (F.) Eadie

**120. Biology and Conservation of Fishes (3)**

Lecture—3 hours. Prerequisite: Biological Sciences Biological Sciences 2A, 2B, 2C; upper division ecology course recommended. Evolution, ecology, and conservation of marine and freshwater fishes.—F. (F.)

**120L. Laboratory in Biology and Conservation of Fishes (2)**

Laboratory—3 hours. Prerequisite: course 120 (can be concurrent); consent of instructor. Limited enrollment. Morphology, taxonomy, conservation, and identification of marine and freshwater fishes with emphasis on California species.—F. (F.)

**121. Physiology of Fishes (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: upper division courses in nutrition and physiology or consent of instructor. Comparative physiology, growth, reproduction, behavior, and energy relations of fishes. Offered irregularly. GE credit: SciEng, Wrt | SE, WE.

**122. Population Dynamics and Estimation (4)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 16A-16B; Statistics 13 or the equivalent; an upper division course in ecology. Description of bird, mammal and fish population dynamics, modeling philosophy, techniques for estimation of animal abundance (e.g., mark-recapture, change-in-ratio, etc.), mathematical models of populations (e.g., Leslie matrix, logistic, dynamic pool, stock-recruitment); case histories.—S. (S.) Botsford

**130. Physiological Ecology of Wildlife (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Evolution and Ecology 101 or Environmental Science and Policy 100 or equivalent course. Principles of physiological ecology, emphasizing vertebrates. Ecological, evolutionary, and behavioral perspectives on physiological mechanisms used by animals to adapt to their environment, including consideration of climate-change and other threats to biodiversity. Tropical, temperate, and polar ecosystems are highlighted. GE credit: SciEng | SE.—W. (W.) Fangue

**134. Herpetology (3)**

Lecture—2 hours; term paper. Prerequisite: Biological Sciences 2A, 2B, 2C; Evolution and Ecology 101 or Environmental Science and Policy 100 or equivalent upper division course recommended. Evolution and ecology of the world's diverse reptiles and amphibians. Emphasis on adaptations to environments, species interactions, management, and conservation. Offered in alternate years.—W. Todd

**134L. Herpetology Laboratory (3)**

Laboratory—6 hours. Prerequisite: Biological Sciences 2A, 2B, 2C; Evolution and Ecology 101 or Environmental Science and Policy 100 or equivalent upper division course recommended; course 134 concurrently; consent of instructor. Diagnostic characteristics and functional attributes of amphibians and reptiles, emphasizing ecological, bio-geo-

graphic and phylogenetic patterns. Field experience with common species of reptiles and amphibians in the Davis area. Offered in alternate years.—W. Todd

**136. Ecology of Waterfowl and Game Birds (4)**

Lecture—3 hours; laboratory—3 hours; fieldwork—1 hour. Prerequisite: course 111, 111L or the equivalent, or consent of instructor. Detailed examination of distribution, behavior, population dynamics, and management of waterfowl and upland game birds. Offered in alternate years.—(W.) Eadie

**141. Behavioral Ecology (4)**

Lecture—3 hours; film viewing—1 hour. Prerequisite: Evolution and Ecology 101 or Environmental Science and Policy 100 or equivalent course. Basic theories underlying the functional and evolutionary significance of behavior, and the role of ecological constraints. Supporting empirical evidence taken mainly from studies of wild vertebrates. Offered in alternate years. GE credit: SciEng | SE.—(W.) Caro

**144. Marine Conservation Science (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: course in introductory ecology. Class size limited to 30 students. Key differences between marine and terrestrial ecosystems, major stressors of marine ecosystems (e.g., fisheries, pollution, bioinvasions, climate change and habitat destruction) and their consequences. Laws and agencies responsible for addressing problems, and the policies used. Offered in alternate years.—(F.) Botsford

**150. Urban Wildlife Ecology (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 2A, 2B, 2C, or the equivalent. Introduction to the behavior, ecology, and evolution of wild animals in urban environments. Effects of urbanization on disease, fitness, and dynamics of animal populations. Conservation and conflict management efforts in urban settings. Offered in alternate years.—W.

**151. Wildlife Ecology (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 2A, 2B, 2C or equivalent. Ecology of wild vertebrates, including habitat selection, spatial organization, demography, population dynamics, competition, predation, herbivory, energetics, and community dynamics, set in the context of human-caused degradation of environments in North America.—F. (F.) Van Vuren

**152. Ecology of Human-Wildlife Conflicts (3)**

Lecture—3 hours. Prerequisite: Biological Sciences 2A, 2B, 2C, or the equivalent. Ecological approaches to managing wild vertebrates that come into conflict with agriculture, public health, or the conservation of biodiversity. Offered in alternate years.—W. Van Vuren

**153. Wildlife Ecotoxicology (4)**

Lecture—3 hours; discussion—1 hour. Prerequisite: introductory courses in organic chemistry, ecology, and physiology, or consent of instructor; Environmental Toxicology 101 recommended. Various forms of environmental pollution in relation to fish and wildlife, the effects and mechanisms of pollutants, effects on individuals and systems, laboratory and field ecotoxicology, examples/case histories, philosophical/management considerations. Offered irregularly. GE credit: SciEng, Wrt | SE, WE.

**154. Conservation Biology (4)**

Lecture—3 hours; term paper. Prerequisite: Evolution and Ecology 101 or Environmental Science and Policy 100 or the equivalent. Introduction to conservation biology and background to the biological issues and controversies surrounding loss of species and habitats. Review of species' recovery plan. GE credit: SciEng | SE, WE.—F. (F.) Todd

**155. Habitat Conservation and Restoration (3)**

Lecture—3 hours. Prerequisite: Evolution and Ecology 101 or Environmental Science and Policy 100 or equivalent course; course 154 and Environmental Horticulture 160 recommended. Analysis of the

characteristics of wildlife and fish habitats, the conservation of habitats, and restoration. GE credit: SciEng, Wrt | SE, VL, WE. –W. (W.)

### **155L. Habitat Conservation and Restoration Laboratory (2)**

Fieldwork—3 hours; laboratory—3 hours. Prerequisite: Evolution and Ecology 101 or Environmental Science and Policy 100 or equivalent course; course 155 (may be taken concurrently). Analysis of the characteristics of wildlife and fish habitats, application of restoration methods, and evaluation of conservation and restoration projects in the field. Students will also participate during the term in a restoration project. –W. (W.)

### **156. Plant Geography (4)**

Lecture—3 hours; laboratory—3 hours; term paper. Field trips will be substituted for some in-lab activities. Prerequisite: Environmental Science and Policy 100 or Evolution and Ecology 101; Plant Biology 102 or 108 strongly recommended. Survey of the geographical distribution of vegetation types and habitats, with consideration of the environmental and historical factors that determine these patterns. Conservation and management approaches. Analytical field and lab techniques introduced. Offered irregularly. GE credit: SciEng, Wrt | SE, VL, WE.

### **157. Coastal Ecosystems (4)**

Lecture—3 hours; laboratory—3 hours; fieldwork—3 hours. Prerequisite: Environmental Studies 100 or Evolution and Ecology 101; course work in organismal biology, physical geography, and geology recommended. Overview of coastal ecosystems, physical and biological elements and processes, and coastal zone dynamics, including sandy, rocky and muddy shorelines, estuaries, dunes and coastal watersheds. Discussion of the role of historical factors and conservation, restoration, and management approaches. Offered irregularly. GE credit: SciEng | SE, VL.

### **158. Infectious Disease in Ecology and Conservation (3)**

Lecture—3 hours. Prerequisite: Evolution and Ecology 101 or Environmental Science and Policy 100 or Veterinary Medicine 409 or the equivalent. Introduction to the dynamics and control of infectious disease in wildlife, including zoonotic diseases and those threatening endangered species. Basic epidemiological models and their applications. Role of scientists in developing disease control policies. Offered irregularly.

### **160. Animal Coloration (3)**

Lecture/discussion—3 hours. Prerequisite: Biological Sciences 2A, 2B, 2C. Evolutionary and ecological significance of coloration in mammals, birds, reptiles, amphibians, fish, cephalopods, crustaceans, spiders, insects, humans as well as color in fashion, plants and the military. Topics include history, protective coloration, warning coloration, mimicry, sexual dichromatism and color change. Offered in alternate years. –(W.) Caro

### **190. Departmental Research Seminar (1)**

Seminar—1 hour. Prerequisite: upper division standing in the biological sciences. Reports and discussions of recent advances related to wildlife and fisheries biology. May be repeated for credit up to 3 times. (P/NP grading only.)—F, W, S. (F, W, S.)

### **191. Museum Science (2)**

Lecture—1 hour; laboratory—3 hours. Prerequisite: upper division standing and consent of instructor. Principles and methods required to preserve and present biological specimens for research, teaching collections, and museums. (P/NP grading only.) Offered in alternate years. –W. (W.) Engilis

### **192. Internship (1-12)**

Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in all subject areas offered in the department. Internships supervised by a member of the faculty. (P/NP grading only.)—F, W, S, Su. (F, W, S, Su.)

### **195. Field and Laboratory Research (3)**

Laboratory—6 hours; discussion—1 hour. Prerequisite: course 110L, 111L, or 120L; 121 or 130; Evolution and Ecology 101 or the equivalent; and consent of instructor. Critique and practice of research methods applied to field and/or laboratory environments of wild vertebrates. Students work independently or in small groups to design experimental protocol, analyze data, and report their findings. May be repeated two times for credit. GE credit: SciEng | SE.—F, W, S. (F, W, S.)

### **197T. Tutoring in Wildlife and Fisheries (1-5)**

Prerequisite: major in Wildlife, Fish, and Conservation Biology and consent of instructor. Experience in teaching under guidance of faculty member. (P/NP grading only.)—F, W, S. (F, W, S.)

### **198. Directed Group Study (1-5)**

(P/NP grading only.)—F, W, S. (F, W, S.)

### **199. Special Study for Advanced Undergraduates (1-5)**

(P/NP grading only.)—F, W, S. (F, W, S.)

### **Graduate**

#### **223. Conservation Biology and Animal Behavior (3)**

Lecture—1.5 hours; discussion—1.5 hours. Prerequisite: Ecology 208 or Animal Behavior 221. Influences of concepts of animal behavior (functional, evolutionary, developmental, mechanistic, and methodological issues) on conservation biology theory and practice. Offered in alternate years. (S.)—Caro

#### **230. Advanced Physiological Ecology of Wildlife (4)**

Lecture—3 hours; discussion—1 hour. Advanced principles of physiological ecology. Ecological, evolutionary and behavioral perspectives on physiological mechanisms used by animals to adapt to their environment in the context of climate change and other threats to biodiversity. Primary literature will form the basis of discussion. –W. (W.) Fangue

#### **223. Conservation Biology and Animal Behavior (3)**

Lecture—1.5 hours; discussion—1.5 hours. Prerequisite: Ecology 208 or Animal Behavior 221; consent of instructor. Influences of concepts of animal behavior (functional, evolutionary, developmental, mechanistic, and methodological issues) on conservation biology theory and practice. Offered in alternate years. —(S.) Caro

#### **262. Advanced Population Dynamics (3)**

Lecture—3 hours. Prerequisite: graduate standing; advanced course in ecology (e.g., Evolution and Ecology 101), population dynamics (e.g., course 122), and one year of calculus; familiarity with matrix algebra and partial differential equations recommended. Logical basis for population models, evaluation of simple ecological models, current population models with age, size, and stage structure, theoretical basis for management and exemplary case histories. Emphasis on development and use of realistic population models in ecological research. (Same course as Ecology 262.) Offered irregularly. –W. (W.) Botsford

#### **290. Seminar (1-3)**

Seminar—1-3 hours. Prerequisite: consent of instructor. Seminar devoted to a highly specific research topic in any area of wildlife or fisheries biology. Special topic selected for a quarter will vary depending on interests of instructor and students. (S/U grading only.)—F, W, S. (F, W, S.)

#### **290C. Research Group Conference (1)**

Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference on research problems, progress and techniques in wildlife and fishery sciences. May be repeated for credit. (S/U grading only.)—F, W, S. (F, W, S.)

### **291. Seminar in Aquatic Ecology (2)**

Seminar—2 hours. Prerequisite: graduate standing in biology. Presentation and analysis of assigned topics in aquatic ecology emphasizing fish, fisheries and aquatic conservation. Offered in alternate years. (S/U grading only.)—S. (S.)

### **292. Physiology of Fishes Seminar (1)**

Seminar—1 hour. Prerequisite: graduate standing and at least two courses in physiology; consent of instructor. Seminar devoted to current topics concerning the physiological functioning of fishes. May be repeated two times for credit. Offered irregularly. (S/U grading only.)—F. (F.)

### **294. Behavioral Ecology of Predators and Prey (3)**

Seminar—2 hours. Prerequisite: graduate standing. Presentation and analysis of research papers on social and foraging behavior of predatory animals, antipredator strategies of prey species, co-evolution of predators and prey, and ecology of predator-prey interactions. May be repeated two times for credit. (Same course as Animal Behavior 294.) Offered in alternate years. –W. Caro

### **295. Seminar in Wildlife Ecotoxicology (3)**

Seminar—2 hours; term paper. Prerequisite: graduate standing in biology. Presentation and analysis of assigned research papers on transport, exposure, and effects of environmental contaminants on wildlife-associated ecosystem components, especially at individual/population levels. Specific subjects vary each offering. Offered irregularly. (S/U grading only.)

### **297T. Supervised Teaching in Wildlife and Fisheries Biology (1-3)**

Tutorial—3-9 hours. Prerequisite: meet qualifications for teaching assistant; graduate standing; and consent of instructor. Tutoring and teaching students in undergraduate courses in Wildlife, Fish, and Conservation Biology. Weekly conferences with instructor; evaluations of teaching; preparing for and conducting demonstrations, laboratories, and discussions; preparing and grading examinations. May be repeated for a total of 6 units when a different course is tutored. (S/U grading only.)—F, W, S. (F, W, S.)

### **298. Group Study (1-5)**

F, W, S. (F, W, S.)

### **299. Research (1-12)**

(S/U grading only.)—F, W, S. (F, W, S.)

Students transferring to UC Davis from another institution or new students declaring the major of Wildlife, Fish, and Conservation Biology must consult the Master Adviser so that their program can be evaluated and a faculty adviser assigned. Contact the Department in 1086 Academic Surge Building or telephone 530-754-9796.

## **Wine Production**

**Food Science and Technology, on page 340; Microbiology and Molecular Genetics, on page 455; and Viticulture and Enology, on page 584.**

## **Women and Gender Studies**

**See Gender, Sexuality and Women's Studies, on page 348.**

## **Zoology**

**See Evolution and Ecology, on page 335.**



GENERAL EDUCATION OPTIONS/COURSES

## NEW GENERAL EDUCATION COURSES; FALL 2011 AND ON

The following section pertains to students who matriculated to UC Davis for the first time in Fall 2011 or later. Students who matriculated prior to Fall 2011 should refer to the [Former General Education Courses; Pre-Fall 2011](#), on page 616.

For the most up-to-date General Education courses, use the class search tool at <http://classes.ucdavis.edu/>.

### TOPICAL BREADTH

These courses satisfy the GE requirement for Topical Breadth.

#### Arts & Humanities (AH)

Afr Am & Afr Std 12 †	Art History 1E	Art Studio 114C	Chinese 11
Afr Am & Afr Std 15	Art History 5	Art Studio 117	Chinese 50
Afr Am & Afr Std 16	Art History 25	Art Studio 121	Chinese 100A
Afr Am & Afr Std 18 †	Art History 100	Art Studio 125A	Chinese 100B
Afr Am & Afr Std 50	Art History 110	Art Studio 125B	Chinese 101
Afr Am & Afr Std 51	Art History 120A †	Art Studio 125C	Chinese 102
Afr Am & Afr Std 52	Art History 130	Art Studio 125D	Chinese 103
Afr Am & Afr Std 100	Art History 148	Art Studio 129	Chinese 104
Afr Am & Afr Std 107C †	Art History 150	Art Studio 138	Chinese 105
Afr Am & Afr Std 107D †	Art History 151	Art Studio 142A	Chinese 106
Afr Am & Afr Std 111 †	Art History 152	Art Studio 142B	Chinese 107
Afr Am & Afr Std 152	Art History 154 †	Art Studio 142C	Chinese 108
Afr Am & Afr Std 153	Art History 155 †	Art Studio 147	Chinese 109A
Afr Am & Afr Std 155A	Art History 156	Art Studio 148	Chinese 109C
Afr Am & Afr Std 156	Art History 163A	Art Studio 149	Chinese 109D
Afr Am & Afr Std 157	Art History 163B	Art Studio 150	Chinese 109E
Afr Am & Afr Std 162	Art History 163C	Art Studio 151	Chinese 109G
Afr Am & Afr Std 163	Art History 163D	Art Studio 152A	Chinese 109H
Afr Am & Afr Std 168	Art History 164	Art Studio 152B	Chinese 109I
Afr Am & Afr Std 169	Art History 168	Art Studio 152C	Chinese 110
Afr Am & Afr Std 170	Art History 172A	Art Studio 152D	Chinese 111
Afr Am & Afr Std 171	Art History 172B	Art Studio 152E	Chinese 111A
Afr Am & Afr Std 175A	Art History 173	Art Studio 152F	Chinese 112
Afr Am & Afr Std 175B	Art History 175	Art Studio 152G	Chinese 113
Afr Am & Afr Std 177 †	Art History 176A	Art Studio 171	Chinese 114
Afr Am & Afr Std 178 †	Art History 176B	Art Studio 190	Chinese 115
Afr Am & Afr Std 181	Art History 176C	Asian American Studies 1 †	Chinese 116
Afr Am & Afr Std 182	Art History 177	Asian American Studies 2 †	Chinese 120
Afr Am & Afr Std 185	Art History 178B	Asian American Studies 4	Chinese 130
American Studies 1B †	Art History 178C	Asian American Studies 100 †	Chinese 131
American Studies 1C †	Art History 179B	Asian American Studies 112 †	Chinese 132
American Studies 1E †	Art History 182	Asian American Studies 113 †	Chinese 133
American Studies 5 †	Art History 183A	Asian American Studies 116 †	Chinese 134 †
American Studies 10 †	Art History 183B	Asian American Studies 121	Chinese 140
American Studies 21	Art History 183C	Asian American Studies 130	Chinese 150
American Studies 25 †	Art History 184	Asian American Studies 141 †	Chinese 160
American Studies 30 †	Art History 185	Asian American Studies 150B †	Chinese 194H
American Studies 55 †	Art History 186	Asian American Studies 150C †	Cinema & Technocultural Stud 12 †
American Studies 59 †	Art History 187	Asian American Studies 150D †	Cinema & Technocultural Stud 20
American Studies 110 †	Art History 188A	Asian American Studies 150E †	Cinema & Technocultural Stud 40A
American Studies 120 †	Art History 188B	Asian American Studies 150F †	Cinema & Technocultural Stud 40B †
American Studies 130	Art History 188C	Asian American Studies 189B †	Cinema & Technocultural Stud 41A
American Studies 139 †	Art History 189	Asian American Studies 189E †	Cinema & Technocultural Stud 41B
American Studies 151 †	Art History 190A	Asian American Studies 189H †	Cinema & Technocultural Stud 116
American Studies 152 †	Art History 190B	Asian American Studies 189I †	Cinema & Technocultural Stud 124E
American Studies 153 †	Art History 190C	Chicano Studies 10 †	Cinema & Technocultural Stud 146A
American Studies 154 †	Art History 190D	Chicano Studies 23 †	Cinema & Technocultural Stud 147A
American Studies 155 †	Art History 190F	Chicano Studies 50	Cinema & Technocultural Stud 148B
American Studies 156 †	Art History 190G	Chicano Studies 60	Cinema & Technocultural Stud 150 †
American Studies 157 †	Art History 190H	Chicano Studies 65	Cinema & Technocultural Stud 162 †
American Studies 158	Art History 190I	Chicano Studies 70	Cinema & Technocultural Stud 172 †
Anthropology 20 †	Art History 190J	Chicano Studies 73	Classics 1
Anthropology 30 †	Art History 190K	Chicano Studies 150 †	Classics 2
Anthropology 124	Art History 190L	Chicano Studies 154	Classics 3
Anthropology 134 †	Art Studio 2	Chicano Studies 155	Classics 4
Anthropology 145 †	Art Studio 5	Chicano Studies 156	Classics 10
Anthropology 186A †	Art Studio 7	Chicano Studies 157	Classics 10Y
Arabic 1	Art Studio 8	Chicano Studies 160	Classics 15
Arabic 1A	Art Studio 9	Chicano Studies 161 †	Classics 20
Arabic 2	Art Studio 10	Chicano Studies 165	Classics 25
Arabic 3	Art Studio 11	Chicano Studies 170	Classics 30
Arabic 21	Art Studio 12	Chicano Studies 171	Classics 30F
Arabic 21C	Art Studio 24	Chicano Studies 172	Classics 31
Arabic 22	Art Studio 30	Chicano Studies 181 †	Classics 50
Arabic 22C	Art Studio 101	Chinese 1	Classics 51
Arabic 23	Art Studio 102A	Chinese 1A	Classics 101A
Arabic 23C	Art Studio 102B	Chinese 1BL	Classics 101B
Arabic 101A †	Art Studio 102C	Chinese 1CN	Classics 101C
Arabic 121	Art Studio 103A	Chinese 2	Classics 101D
Arabic 122	Art Studio 103B	Chinese 2BL	Classics 101E
Arabic 123	Art Studio 105A	Chinese 2CN	Classics 102
Arabic 140	Art Studio 105B	Chinese 3	Classics 105
Arabic 141	Art Studio 110A	Chinese 3BL	Classics 110
Art History 1A	Art Studio 110B	Chinese 3CN	Classics 120
Art History 1B	Art Studio 111A	Chinese 4	Classics 125
Art History 1C	Art Studio 111B	Chinese 4A	Classics 140
Art History 1D	Art Studio 112	Chinese 5	Classics 141
Art History 1DY	Art Studio 113	Chinese 6	Classics 142
Art History 1D	Art Studio 114A	Chinese 7 †	Classics 143
Art History 1DY	Art Studio 114B	Chinese 10	Classics 150

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Classics 171	Design 117	English 40	French 2
Classics 172A	Design 127A	English 41	French 2S
Classics 172B	Design 127B	English 42	French 3
Classics 173	Design 131	English 43	French 3S
Classics 174	Design 132A	English 44	French 21
Classics 175	Design 132B	English 45	French 21S
Classics 190	Design 134A	English 105	French 22
Classics 194HA	Design 134B	English 106	French 22S
Classics 194HB	Design 135A	English 107	French 23
Communication 5 †	Design 135B	English 110A	French 23S
Comparative Literature 1	Design 136A	English 110B	French 50
Comparative Literature 2	Design 136B	English 111	French 51
Comparative Literature 3	Design 137A	English 113A	French 52
Comparative Literature 4	Design 137B	English 113B	French 53
Comparative Literature 5	Design 138	English 115	French 100
Comparative Literature 6	Design 142A	English 117	French 101
Comparative Literature 7	Design 142B	English 120	French 102
Comparative Literature 8	Design 143	English 122	French 107
Comparative Literature 9	Design 144	English 123	French 107A
Comparative Literature 11	Design 145	English 125	French 107B
Comparative Literature 12	Design 149	English 130	French 107S
Comparative Literature 13	Design 150A	English 133	French 115
Comparative Literature 14	Design 150B	English 137	French 116
Comparative Literature 20	Design 151	English 138	French 117A
Comparative Literature 24	Design 154	English 139	French 117B
Comparative Literature 25	Design 157	English 140	French 118A
Comparative Literature 53A	Design 159	English 141	French 118B
Comparative Literature 53B	Design 160	English 142	French 119A
Comparative Literature 53C	Design 161	English 143	French 119B
Comparative Literature 100	Design 170	English 144	French 119C
Comparative Literature 110	Design 171	English 146	French 120
Comparative Literature 120	Design 177	English 147	French 121
Comparative Literature 135	Design 179	English 149	French 122
Comparative Literature 138	Design 180A	English 150A	French 124
Comparative Literature 139	Design 180B	English 150B	French 125
Comparative Literature 140	Design 185	English 153	French 125S
Comparative Literature 141	Design 186	English 155A	French 127
Comparative Literature 142	Design 187	English 155B	French 128S
Comparative Literature 144	Dramatic Art 1	English 155C	French 130
Comparative Literature 145	Dramatic Art 2	English 156	French 133
Comparative Literature 146	Dramatic Art 5	English 158A	French 140
Comparative Literature 147	Dramatic Art 20	English 158B	French 141
Comparative Literature 148	Dramatic Art 24	English 159	French 141S
Comparative Literature 151	Dramatic Art 28	English 160	French 160 †
Comparative Literature 152	Dramatic Art 40A	English 161A	French 161 †
Comparative Literature 152S	Dramatic Art 40B	English 161B	French 162 †
Comparative Literature 153	Dramatic Art 42A	English 162	French 194H
Comparative Literature 154	Dramatic Art 42B	English 163	French 195H
Comparative Literature 155	Dramatic Art 43A	English 164	German 1
Comparative Literature 156	Dramatic Art 43B	English 165	German 2
Comparative Literature 157	Dramatic Art 55	English 166	German 3
Comparative Literature 158	Dramatic Art 56A	English 167	German 6
Comparative Literature 159	Dramatic Art 56B	English 168	German 10
Comparative Literature 160A	Dramatic Art 56C	English 171A	German 11
Comparative Literature 160B	Dramatic Art 114 †	English 171B	German 20
Comparative Literature 161A	Dramatic Art 116	English 172 †	German 21
Comparative Literature 161B	Dramatic Art 122C	English 173	German 22
Comparative Literature 162	Dramatic Art 124A	English 175	German 40
Comparative Literature 163	Dramatic Art 124B	English 177	German 45
Comparative Literature 164A	Dramatic Art 124C	English 178	German 48
Comparative Literature 164B	Dramatic Art 124D	English 179	German 101A
Comparative Literature 164C	Dramatic Art 124E	English 180	German 101B
Comparative Literature 164D	Dramatic Art 125	English 181A	German 103
Comparative Literature 165	Dramatic Art 130	English 181B	German 104
Comparative Literature 165S	Dramatic Art 142	English 182	German 105
Comparative Literature 166	Dramatic Art 143	English 183	German 112
Comparative Literature 166A	Dramatic Art 144 †	English 184	German 113
Comparative Literature 166B	Dramatic Art 144A †	English 185A	German 114
Comparative Literature 167	Dramatic Art 144B †	English 185B	German 115
Comparative Literature 168A	Dramatic Art 144C	English 185C	German 116
Comparative Literature 168B	Dramatic Art 150	English 186	German 117
Comparative Literature 169	Dramatic Art 154	English 189	German 118A
Comparative Literature 170	Dramatic Art 155	English 194H	German 118B
Comparative Literature 172	Dramatic Art 155A	English 195H	German 118E
Comparative Literature 175	Dramatic Art 155B	Entomology 1 †	German 119
Comparative Literature 180	Dramatic Art 156AN	Film Studies 1	German 120
Comparative Literature 180S	Dramatic Art 156B	Film Studies 45	German 121
Comparative Literature 194H	Dramatic Art 156C	Film Studies 120	German 122
Comparative Literature 195	Dramatic Art 156D	Film Studies 121	German 123
Critical Theory 101	Dramatic Art 159	Film Studies 121S	German 124
Design 1	Dramatic Art 159S	Film Studies 124	German 125
Design 14	Dramatic Art 170	Film Studies 125	German 126
Design 15	Dramatic Art 180B	Film Studies 127	German 127
Design 16	Dramatic Art 195	Film Studies 129	German 129
Design 21	Education 147	Film Studies 142	German 131
Design 31	Education 152 †	Film Studies 176A	German 132
Design 40A	Engr: Computer Science 12 †	Film Studies 176B	German 133
Design 40B	English 3	Film Studies 189	German 134
Design 40C	English 4	Film Studies 195H	German 141
Design 50	English 5F	Film Studies 196H	German 142
Design 70	English 5NF	Food Science & Technology 55 †	German 143
Design 77	English 5P	Food Science & Technology 159 † ..	German 144
Design 107	English 10A	French 1	German 160
Design 115	English 10B	French 1A	German 168
Design 116	English 10C	French 1S	German 176A

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

German 185	History 136 †	History 196A †	Japanese 113
Greek 1	History 138A †	History 196B †	Japanese 117S
Greek 2	History 138B †	Human Rights 1 †	Japanese 121
Greek 2NT	History 138C †	Human Rights 120A †	Japanese 122
Greek 3	History 139A †	Human Rights 130 †	Japanese 123
Greek 3NT	History 139B †	Human Rights 131 †	Japanese 130
Greek 100	History 140 †	Human Rights 134 †	Japanese 131
Greek 101	History 141 †	Human Rights 136 †	Japanese 132
Greek 102	History 142A †	Human Rights 138	Japanese 133
Greek 103A	History 142B †	Human Rights 161 †	Japanese 134
Greek 103B	History 143 †	Humanities 1	Japanese 135
Greek 104	History 144A †	Humanities 1D	Japanese 136
Greek 105	History 144B †	Humanities 2A	Japanese 137
Greek 110	History 145 †	Humanities 2B	Japanese 138
Greek 111	History 146A †	Humanities 3 †	Japanese 151
Greek 112	History 146B †	Humanities 4	Japanese 152
Greek 113	History 147A †	Humanities 4D	Japanese 153
Greek 114	History 147B †	Humanities 7	Japanese 154
Greek 115	History 147C †	Humanities 8	Japanese 155
Greek 116	History 148A †	Humanities 9	Japanese 156
Greek 121	History 148B †	Humanities 9D	Japanese 157
Greek 130	History 148C †	Humanities 13	Japanese 158
Hebrew 1	History 149 †	Humanities 15 †	Japanese 194H
Hebrew 1A	History 151A †	Humanities 60	Japanese 198
Hebrew 2	History 151B †	Humanities 144	Japanese 199
Hebrew 3	History 151C †	Humanities 180	Jewish Studies 101
Hebrew 10	History 151D †	Integrated Studies 8B	Jewish Studies 110
Hebrew 100AN	History 159 †	Italian 1	Jewish Studies 111
Hebrew 100BN	History 160 †	Italian 1S	Jewish Studies 112
Hebrew 100CN	History 161 †	Italian 2	Jewish Studies 116
Hindi/Urdu 1	History 162 †	Italian 2S	Jewish Studies 120
Hindi/Urdu 1A	History 163A †	Italian 3	Landscape Architecture 1 †
Hindi/Urdu 2	History 163B †	Italian 3S	Landscape Architecture 10 †
Hindi/Urdu 3	History 164 †	Italian 9	Landscape Architecture 21
Hindi/Urdu 21	History 165 †	Italian 9S	Landscape Architecture 30
Hindi/Urdu 22	History 166A †	Italian 50	Landscape Architecture 60 †
Hindi/Urdu 23	History 166B †	Italian 101	Landscape Architecture 70
History 3 †	History 167 †	Italian 101S	Landscape Architecture 102
History 4A †	History 168 †	Italian 104	Landscape Architecture 140 †
History 4B †	History 169A †	Italian 104S	Landscape Architecture 141 †
History 4C †	History 169B †	Italian 105	Landscape Architecture 142 †
History 6 †	History 170A †	Italian 107 †	Landscape Architecture 160
History 7A †	History 170B †	Italian 107S	Landscape Architecture 170
History 7B †	History 170C †	Italian 108 †	Landscape Architecture 171
History 7C †	History 171A †	Italian 108S †	Landscape Architecture 180
History 8 †	History 171B †	Italian 112	Latin 1
History 9A †	History 171BF †	Italian 113	Latin 2
History 9B †	History 171D †	Italian 114	Latin 3
History 10A †	History 172 †	Italian 115A	Latin 100
History 10B †	History 173 †	Italian 115C	Latin 101
History 10C †	History 174A †	Italian 115D	Latin 102
History 11	History 174B †	Italian 118	Latin 103
History 12 †	History 174C †	Italian 119	Latin 104
History 15 †	History 174D †	Italian 120A	Latin 105
History 17A †	History 175 †	Italian 120B	Latin 106
History 17B †	History 176A †	Italian 121	Latin 108
History 72A †	History 176B †	Italian 121S	Latin 109
History 72B †	History 177A †	Italian 128	Latin 110
History 80 †	History 177B †	Italian 131	Latin 112
History 85 †	History 178A †	Italian 139B	Latin 115
History 102S †	History 178B †	Italian 140	Latin 116
History 105 †	History 179 †	Italian 141	Latin 118
History 108 †	History 180AN †	Italian 142	Latin 119
History 109A †	History 180BN †	Italian 145	Latin 120
History 110 †	History 181 †	Italian 145S	Latin 121
History 110A †	History 182 †	Italian 150	Latin 125
History 111A †	History 183A †	Italian 190X	Latin 130
History 111B †	History 183B †	Italian 194H	Linguistics 1 †
History 111C †	History 184 †	Italian 195H	Linguistics 1Y †
History 112A †	History 185A †	Japanese 1	Linguistics 5 †
History 112B †	History 185B †	Japanese 1A	Linguistics 15 †
History 113 †	History 189 †	Japanese 1AS	Linguistics 103A
History 115A †	History 190A †	Japanese 2	Linguistics 103B
History 115B †	History 190B †	Japanese 3	Linguistics 106
History 115C †	History 190C †	Japanese 4	Linguistics 111
History 115D †	History 190D †	Japanese 5	Linguistics 121
History 115E †	History 191A †	Japanese 6	Linguistics 127 †
History 115F †	History 191B †	Japanese 7S	Linguistics 131
History 116 †	History 191C †	Japanese 10	Linguistics 141
History 121A †	History 191D †	Japanese 15S	Linguistics 150 †
History 121B †	History 191E †	Japanese 25 †	Linguistics 151
History 121C †	History 191F †	Japanese 31	Linguistics 152
History 122 †	History 191G	Japanese 50	Medieval Studies 20A
History 125 †	History 191H	Japanese 98	Medieval Studies 20B
History 130A †	History 191J	Japanese 101	Medieval Studies 130A
History 130B †	History 193A †	Japanese 102	Medieval Studies 130B
History 130C †	History 193B †	Japanese 103	Middle East/S. Asian Std 100 †
History 131A †	History 193C †	Japanese 104	Middle East/S. Asian Std 111A †
History 131B †	History 193D †	Japanese 105	Middle East/S. Asian Std 121A
History 131C †	History 194A †	Japanese 106	Middle East/S. Asian Std 121C
History 132 †	History 194B †	Japanese 107	Middle East/S. Asian Std 122A
History 133 †	History 194C †	Japanese 108	Middle East/S. Asian Std 131A
History 134A †	History 194D †	Japanese 109	Middle East/S. Asian Std 150 †
History 135A †	History 194E †	Japanese 111	Middle East/S. Asian Std 151A
History 135B †	History 195B †	Japanese 112	Middle East/S. Asian Std 180 †

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Middle East/S. Asian Std 181A †	Native American Studies 181C	Portuguese 163	Science & Tech Studies 130B †
Middle East/S. Asian Std 181B †	Native American Studies 184 †	Portuguese 198	Science & Tech Studies 131 †
Middle East/S. Asian Std 181C †	Native American Studies 185	Portuguese 199	Science & Tech Studies 151 †
Music 2A	Native American Studies 188	Religious Studies 1	Science & Tech Studies 160 †
Music 2B	Native American Studies 191 †	Religious Studies 1A	Science & Tech Studies 162 †
Music 2C	Native American Studies 192	Religious Studies 1B	Science & Tech Studies 164
Music 3A	Persian 1	Religious Studies 1C	Science & Tech Studies 172 †
Music 3B	Philosophy 1	Religious Studies 1D	Science & Tech Studies 173
Music 6A	Philosophy 7	Religious Studies 1E †	Science and Society 40 †
Music 6B	Philosophy 7Y	Religious Studies 1F	Science and Society 41
Music 6C	Philosophy 11	Religious Studies 1G	Science and Society 42 †
Music 7A	Philosophy 12	Religious Studies 1H	Spanish 1
Music 7B	Philosophy 13G †	Religious Studies 1J	Spanish 1A
Music 7C	Philosophy 14	Religious Studies 10	Spanish 1S
Music 10	Philosophy 15	Religious Studies 10A	Spanish 2
Music 11	Philosophy 16	Religious Studies 11	Spanish 2S
Music 16A	Philosophy 21	Religious Studies 12	Spanish 2V
Music 16B	Philosophy 24	Religious Studies 15Y	Spanish 2Y
Music 16C	Philosophy 30 †	Religious Studies 21	Spanish 3
Music 17A	Philosophy 31 †	Religious Studies 23	Spanish 3S
Music 17B	Philosophy 32 †	Religious Studies 30	Spanish 3V
Music 17C	Philosophy 38 †	Religious Studies 40	Spanish 3Y
Music 24A	Philosophy 101	Religious Studies 42	Spanish 21
Music 24B	Philosophy 102	Religious Studies 45	Spanish 21S
Music 24C	Philosophy 103	Religious Studies 60 †	Spanish 21V
Music 28	Philosophy 105	Religious Studies 65C	Spanish 21Y
Music 98	Philosophy 107 †	Religious Studies 67 †	Spanish 22
Music 99	Philosophy 108 †	Religious Studies 68	Spanish 22S
Music 101A	Philosophy 109 †	Religious Studies 69	Spanish 22V †
Music 101B	Philosophy 111	Religious Studies 70	Spanish 22Y
Music 102	Philosophy 112	Religious Studies 80	Spanish 23
Music 103	Philosophy 113	Religious Studies 100 †	Spanish 23S
Music 105	Philosophy 114	Religious Studies 102	Spanish 24
Music 106	Philosophy 115	Religious Studies 103	Spanish 24S
Music 107A	Philosophy 116	Religious Studies 105	Spanish 31
Music 107B	Philosophy 117	Religious Studies 106	Spanish 32
Music 108A	Philosophy 118	Religious Studies 110	Spanish 33
Music 108B	Philosophy 119	Religious Studies 111	Spanish 100
Music 110A	Philosophy 120	Religious Studies 115	Spanish 100S
Music 110B	Philosophy 121	Religious Studies 120	Spanish 115 †
Music 110C	Philosophy 123	Religious Studies 122	Spanish 115S †
Music 110D	Philosophy 125	Religious Studies 125	Spanish 130
Music 110E	Philosophy 128	Religious Studies 131 †	Spanish 131N
Music 110F	Philosophy 129	Religious Studies 132	Spanish 132
Music 110G	Philosophy 131	Religious Studies 134 †	Spanish 133N
Music 113	Philosophy 134	Religious Studies 138	Spanish 134A
Music 114	Philosophy 135	Religious Studies 140	Spanish 134B
Music 115	Philosophy 136	Religious Studies 141A	Spanish 135N
Music 116	Philosophy 137A	Religious Studies 141B	Spanish 136N
Music 121	Philosophy 137B	Religious Studies 141C	Spanish 137N
Music 122	Philosophy 137C	Religious Studies 143	Spanish 138N
Music 123	Philosophy 141	Religious Studies 144	Spanish 139
Music 124A	Philosophy 143	Religious Studies 145	Spanish 140N
Music 124B	Philosophy 145	Religious Studies 150	Spanish 141
Music 126	Philosophy 151	Religious Studies 154 †	Spanish 141S
Music 127	Philosophy 156	Religious Studies 156	Spanish 142
Music 129A	Philosophy 157	Religious Studies 157	Spanish 143
Music 129B	Philosophy 160	Religious Studies 158	Spanish 144
Music 129C	Philosophy 161	Religious Studies 160	Spanish 147
Music 129D	Philosophy 162	Religious Studies 161	Spanish 148
Music 132	Philosophy 168	Religious Studies 161B †	Spanish 148S
Music 141	Philosophy 170	Religious Studies 162	Spanish 149
Music 142	Philosophy 172	Religious Studies 163 †	Spanish 150N
Music 143	Philosophy 174	Religious Studies 170	Spanish 151
Music 144	Philosophy 175	Religious Studies 175A	Spanish 151N
Music 145	Philosophy 178	Russian 1	Spanish 153
Music 146	Philosophy 189A	Russian 2	Spanish 154
Music 147	Philosophy 189B	Russian 3	Spanish 155
Music 148	Philosophy 189D	Russian 4	Spanish 156
Music 149	Philosophy 189E	Russian 5	Spanish 157
Music 150	Philosophy 189F	Russian 6	Spanish 158
Music 151	Philosophy 189G	Russian 101A	Spanish 159
Music 192	Philosophy 189H	Russian 101B	Spanish 159S
Music 194HA	Philosophy 189I †	Russian 101C	Spanish 159Y
Music 194HB	Philosophy 189J	Russian 102	Spanish 160
Music 195	Philosophy 189K	Russian 105	Spanish 170
Music 198	Political Science 4 †	Russian 122	Spanish 170S
Music 199	Political Science 51 †	Russian 124	Spanish 171
Native American Studies 5	Political Science 112 †	Russian 126	Spanish 171S
Native American Studies 7 †	Political Science 113 †	Russian 129	Spanish 172
Native American Studies 10 †	Political Science 114 †	Russian 130	Spanish 173
Native American Studies 12 †	Political Science 115 †	Russian 133	Spanish 174
Native American Studies 33 †	Political Science 116 †	Russian 139	Spanish 175
Native American Studies 34	Political Science 118A †	Russian 140	Spanish 176
Native American Studies 101 †	Political Science 118B †	Russian 141	Spanish 178A †
Native American Studies 108 †	Political Science 118C †	Russian 142	Spanish 179 †
Native American Studies 115 †	Political Science 119 †	Russian 143	Spanish 179Y †
Native American Studies 125 †	Portuguese 100	Russian 150	Spanish 180 †
Native American Studies 133A †	Portuguese 130	Russian 192	Spanish 181
Native American Studies 133B †	Portuguese 132	Science & Tech Studies 40A †	Spanish 182
Native American Studies 135 †	Portuguese 134	Science & Tech Studies 40B †	Spanish 194H
Native American Studies 157	Portuguese 141	Science & Tech Studies 50	Spanish 198
Native American Studies 180 †	Portuguese 159	Science & Tech Studies 51	Spanish 199
Native American Studies 181A	Portuguese 161	Science & Tech Studies 120	Technocultural Studies 1
Native American Studies 181B	Portuguese 162	Science & Tech Studies 130A †	Technocultural Studies 5 †

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Technocultural Studies 155  
 Technocultural Studies 158  
 Technocultural Studies 160 †  
 Textiles & Clothing 7 †  
 University Writing Program 1  
 University Writing Program 1V  
 University Writing Program 1Y  
 University Writing Program 10  
 University Writing Program 11  
 University Writing Program 12  
 University Writing Program 18  
 University Writing Program 19  
 University Writing Program 98  
 University Writing Program 99  
 University Writing Program 100  
 University Writing Program 101  
 University Writing Program 102A  
 University Writing Program 102B  
 University Writing Program 102C  
 University Writing Program 102D  
 University Writing Program 102E  
 University Writing Program 102F  
 University Writing Program 102G  
 University Writing Program 102H  
 University Writing Program 102I  
 University Writing Program 102J  
 University Writing Program 102K  
 University Writing Program 102L  
 University Writing Program 102M  
 University Writing Program 104A  
 University Writing Program 104B  
 University Writing Program 104C  
 University Writing Program 104D  
 University Writing Program 104E  
 University Writing Program 104F  
 University Writing Program 104FY  
 University Writing Program 104I  
 University Writing Program 104J  
 University Writing Program 104T  
 University Writing Program 106  
 University Writing Program 110  
 University Writing Program 111A  
 University Writing Program 111B  
 University Writing Program 111C  
 University Writing Program 112A  
 University Writing Program 120 †  
 University Writing Program 121 †  
 University Writing Program 192  
 University Writing Program 197T  
 University Writing Program 197TC  
 University Writing Program 198  
 University Writing Program 199  
 Women's Studies 20 †  
 Women's Studies 25  
 Women's Studies 50 †  
 Women's Studies 60 †  
 Women's Studies 70 †  
 Women's Studies 102 †  
 Women's Studies 103 †  
 Women's Studies 104 †  
 Women's Studies 130 †  
 Women's Studies 136 †  
 Women's Studies 137 †  
 Women's Studies 138 †  
 Women's Studies 139 †  
 Women's Studies 145 †  
 Women's Studies 146 †  
 Women's Studies 148 †  
 Women's Studies 158 †  
 Women's Studies 160  
 Women's Studies 162  
 Women's Studies 164  
 Women's Studies 165 †  
 Women's Studies 170 †  
 Women's Studies 175 †  
 Women's Studies 178A  
 Women's Studies 178B  
 Women's Studies 178C  
 Women's Studies 178D  
 Women's Studies 178E  
 Women's Studies 178F  
 Women's Studies 179  
 Women's Studies 180  
 Women's Studies 182 †  
 Women's Studies 185 †  
 Women's Studies 189 †  
 Women's Studies 190 †  
 Women's Studies 191 †  
 Women's Studies 193 †  
 Women's Studies 194HA †  
 Women's Studies 194HB †  
 Women's Studies 195 †

## Science & Engineering (SE)

Animal Genetics 101  
 Animal Genetics 105  
 Animal Genetics 107  
 Animal Genetics 111  
 Animal Science 1  
 Animal Science 2  
 Animal Science 12  
 Animal Science 15  
 Animal Science 18  
 Animal Science 21  
 Animal Science 22A  
 Animal Science 22B  
 Animal Science 41  
 Animal Science 41L  
 Animal Science 42  
 Animal Science 100  
 Animal Science 103  
 Animal Science 104  
 Animal Science 106  
 Animal Science 112 †  
 Animal Science 115  
 Animal Science 118  
 Animal Science 119  
 Animal Science 120  
 Animal Science 120L  
 Animal Science 123  
 Animal Science 124  
 Animal Science 125  
 Animal Science 126  
 Animal Science 127  
 Animal Science 128  
 Animal Science 129  
 Animal Science 131  
 Animal Science 136  
 Animal Science 137  
 Animal Science 139  
 Animal Science 140  
 Animal Science 142  
 Animal Science 143  
 Animal Science 144  
 Animal Science 145  
 Animal Science 146  
 Animal Science 147  
 Animal Science 149  
 Animal Science 194HA  
 Animal Science 194HB  
 Animal Science 194HC  
 Anthropology 1  
 Anthropology 1Y  
 Anthropology 3 †  
 Anthropology 5  
 Anthropology 13  
 Anthropology 15  
 Anthropology 50  
 Anthropology 54  
 Anthropology 151  
 Anthropology 152  
 Anthropology 153  
 Anthropology 154A  
 Anthropology 154B  
 Anthropology 154C  
 Anthropology 154CL  
 Anthropology 156A  
 Anthropology 156B  
 Anthropology 157  
 Anthropology 157L  
 Anthropology 158  
 Anthropology 159  
 Anthropology 160  
 Anthropology 180  
 Anthropology 181  
 Anthropology 182  
 Anthropology 183  
 Applied Biological System Tech 15  
 Applied Biological System Tech 16  
 Applied Biological System Tech 17  
 Applied Biological System Tech 49  
 Applied Biological System Tech 52  
 Applied Biological System Tech 98  
 Applied Biological System Tech 99  
 Applied Biological System Tech 101  
 Applied Biological System Tech 110L  
 Applied Biological System Tech 121  
 Applied Biological System Tech 142  
 Applied Biological System Tech 150  
 Applied Biological System Tech 161  
 Applied Biological System Tech 163  
 Applied Biological System Tech 165  
 Applied Biological System Tech 181N  
 Applied Biological System Tech 182  
 Applied Biological System Tech 190C  
 Applied Biological System Tech 192  
 Applied Biological System Tech 197T  
 Applied Biological System Tech 198  
 Applied Biological System Tech 199  
 Astronomy 10G  
 Astronomy 10L  
 Astronomy 10S  
 Astronomy 25  
 Atmospheric Science 5  
 Atmospheric Science 6  
 Atmospheric Science 10  
 Atmospheric Science 60  
 Atmospheric Science 110  
 Atmospheric Science 111  
 Atmospheric Science 111LY  
 Atmospheric Science 115  
 Atmospheric Science 116  
 Atmospheric Science 120  
 Atmospheric Science 121A  
 Atmospheric Science 121B  
 Atmospheric Science 124  
 Atmospheric Science 128  
 Atmospheric Science 133  
 Atmospheric Science 149  
 Atmospheric Science 150  
 Atmospheric Science 158  
 Atmospheric Science 160  
 Avian Sciences 11  
 Avian Sciences 13  
 Avian Sciences 14L  
 Avian Sciences 15L  
 Avian Sciences 16LA  
 Avian Sciences 16LB  
 Avian Sciences 16LC  
 Avian Sciences 100  
 Avian Sciences 103  
 Avian Sciences 115  
 Avian Sciences 121  
 Avian Sciences 123  
 Avian Sciences 149  
 Avian Sciences 150  
 Avian Sciences 160  
 Avian Sciences 170  
 Biological Sciences 2A  
 Biological Sciences 2B  
 Biological Sciences 2C  
 Biological Sciences 10  
 Biological Sciences 101  
 Biological Sciences 102  
 Biological Sciences 102Q  
 Biological Sciences 103  
 Biological Sciences 104  
 Biological Sciences 105  
 Biological Sciences 122  
 Biological Sciences 122P  
 Biological Sciences 124  
 Biological Sciences 132  
 Biological Sciences 133  
 Biological Sciences 134  
 Biological Sciences 180L  
 Biological Sciences 181  
 Biological Sciences 183  
 Biological Sciences 194H  
 Biotechnology 1Y  
 Biotechnology 150  
 Biotechnology 160  
 Biotechnology 161A  
 Biotechnology 161B  
 Biotechnology 171  
 Biotechnology 188  
 Biotechnology 194H  
 Chemistry 2A  
 Chemistry 2AH  
 Chemistry 2B  
 Chemistry 2BH  
 Chemistry 2C  
 Chemistry 2CH  
 Chemistry 3A  
 Chemistry 8A  
 Chemistry 8B  
 Chemistry 10  
 Chemistry 105  
 Chemistry 107B  
 Chemistry 110A  
 Chemistry 115  
 Chemistry 118A  
 Chemistry 118B  
 Chemistry 118C  
 Chemistry 124A  
 Chemistry 125  
 Chemistry 131  
 Chemistry 145  
 Chemistry 150  
 Chicano Studies 40  
 Chicano Studies 40S  
 Chicano Studies 140A  
 Cinema & Technocultural Stud 12 †  
 Engineering 1  
 Engineering 2 †  
 Engineering 4  
 Engineering 6  
 Engineering 7  
 Engineering 10 †  
 Engineering 17  
 Engineering 20  
 Engineering 35  
 Engineering 45  
 Engineering 45Y  
 Engineering 100  
 Engineering 102  
 Engineering 103  
 Engineering 104  
 Engineering 104L  
 Engineering 105  
 Engineering 106 †  
 Engineering 111  
 Engineering 121  
 Engineering 122  
 Engineering 160  
 Engineering 180  
 Engineering 198  
 Engr: Aerospace Sci 10 †  
 Engr: Aerospace Sci 126  
 Engr: Aerospace Sci 127  
 Engr: Aerospace Sci 129  
 Engr: Aerospace Sci 130A  
 Engr: Aerospace Sci 130B  
 Engr: Aerospace Sci 133  
 Engr: Aerospace Sci 135  
 Engr: Aerospace Sci 137  
 Engr: Aerospace Sci 138  
 Engr: Aerospace Sci 140  
 Engr: Aerospace Sci 141  
 Engr: Aerospace Sci 142  
 Engr: Aerospace Sci 189C  
 Engr: Biological Systems 1  
 Engr: Biological Systems 75  
 Engr: Biological Systems 90C  
 Engr: Biological Systems 92  
 Engr: Biological Systems 98  
 Engr: Biological Systems 99  
 Engr: Biological Systems 103  
 Engr: Biological Systems 114  
 Engr: Biological Systems 115  
 Engr: Biological Systems 120  
 Engr: Biological Systems 125  
 Engr: Biological Systems 127  
 Engr: Biological Systems 128  
 Engr: Biological Systems 130  
 Engr: Biological Systems 135  
 Engr: Biological Systems 144  
 Engr: Biological Systems 145  
 Engr: Biological Systems 147  
 Engr: Biological Systems 161  
 Engr: Biological Systems 165  
 Engr: Biological Systems 170A  
 Engr: Biological Systems 170B  
 Engr: Biological Systems 170BL  
 Engr: Biological Systems 170C  
 Engr: Biological Systems 170CL  
 Engr: Biological Systems 175  
 Engr: Biological Systems 189A  
 Engr: Biological Systems 189B  
 Engr: Biological Systems 189C  
 Engr: Biological Systems 189D  
 Engr: Biological Systems 189E  
 Engr: Biological Systems 189F  
 Engr: Biological Systems 189G  
 Engr: Biological Systems 190C  
 Engr: Biological Systems 192  
 Engr: Biological Systems 197T  
 Engr: Biological Systems 198  
 Engr: Biological Systems 199  
 Engr: Biomedical 1  
 Engr: Biomedical 20  
 Engr: Biomedical 89A  
 Engr: Biomedical 89B  
 Engr: Biomedical 89C  
 Engr: Biomedical 99  
 Engr: Biomedical 102  
 Engr: Biomedical 105  
 Engr: Biomedical 106  
 Engr: Biomedical 107  
 Engr: Biomedical 108  
 Engr: Biomedical 109  
 Engr: Biomedical 110A  
 Engr: Biomedical 110B  
 Engr: Biomedical 110L  
 Engr: Biomedical 111  
 Engr: Biomedical 116

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Engr: Biomedical 117	Engr: Civil & Environ 128	Engr: Computer Science 175	Engr: Elect & Compu 195B
Engr: Biomedical 118	Engr: Civil & Environ 130	Engr: Computer Science 177	Engr: Elect & Compu 196
Engr: Biomedical 126	Engr: Civil & Environ 131	Engr: Computer Science 178	Engr: Elect & Compu 198
Engr: Biomedical 140	Engr: Civil & Environ 132	Engr: Computer Science 189A	Engr: Materials Science 2
Engr: Biomedical 141	Engr: Civil & Environ 135	Engr: Computer Science 189B	Engr: Materials Science 147
Engr: Biomedical 142	Engr: Civil & Environ 136	Engr: Computer Science 189C	Engr: Materials Science 160
Engr: Biomedical 143	Engr: Civil & Environ 137 †	Engr: Computer Science 189D	Engr: Materials Science 162
Engr: Biomedical 151	Engr: Civil & Environ 138	Engr: Computer Science 189E	Engr: Materials Science 162L
Engr: Biomedical 152	Engr: Civil & Environ 139	Engr: Computer Science 189F	Engr: Materials Science 164
Engr: Biomedical 161A	Engr: Civil & Environ 140	Engr: Computer Science 189G	Engr: Materials Science 170
Engr: Biomedical 161L	Engr: Civil & Environ 140L	Engr: Computer Science 189H	Engr: Materials Science 172
Engr: Biomedical 161S	Engr: Civil & Environ 141	Engr: Computer Science 189I	Engr: Materials Science 172L
Engr: Biomedical 162	Engr: Civil & Environ 141L	Engr: Computer Science 189J	Engr: Materials Science 174
Engr: Biomedical 163	Engr: Civil & Environ 142	Engr: Computer Science 189K	Engr: Materials Science 174L
Engr: Biomedical 167	Engr: Civil & Environ 143	Engr: Computer Science 189L	Engr: Materials Science 180
Engr: Biomedical 173	Engr: Civil & Environ 144	Engr: Computer Science 193A	Engr: Materials Science 181
Engr: Biomedical 189A	Engr: Civil & Environ 145	Engr: Computer Science 193B	Engr: Materials Science 182
Engr: Biomedical 189B	Engr: Civil & Environ 146	Engr: Elect & Compu 1	Engr: Materials Science 188A
Engr: Biomedical 189C	Engr: Civil & Environ 148A	Engr: Elect & Compu 10	Engr: Materials Science 188B
Engr: Biomedical 190A	Engr: Civil & Environ 148B	Engr: Elect & Compu 70	Engr: Mechanical 5
Engr: Biomedical 192	Engr: Civil & Environ 149	Engr: Elect & Compu 89A	Engr: Mechanical 50
Engr: Biomedical 198	Engr: Civil & Environ 150	Engr: Elect & Compu 89B	Engr: Mechanical 106
Engr: Biomedical 199	Engr: Civil & Environ 153	Engr: Elect & Compu 89C	Engr: Mechanical 108
Engr: Chemical 51	Engr: Civil & Environ 155 †	Engr: Elect & Compu 89D	Engr: Mechanical 109
Engr: Chemical 80 †	Engr: Civil & Environ 161	Engr: Elect & Compu 89E	Engr: Mechanical 115
Engr: Chemical 98	Engr: Civil & Environ 162	Engr: Elect & Compu 89F	Engr: Mechanical 121
Engr: Chemical 99	Engr: Civil & Environ 163 †	Engr: Elect & Compu 100	Engr: Mechanical 134
Engr: Chemical 140	Engr: Civil & Environ 165 †	Engr: Elect & Compu 110A	Engr: Mechanical 139
Engr: Chemical 141	Engr: Civil & Environ 171	Engr: Elect & Compu 110B	Engr: Mechanical 150A
Engr: Chemical 142	Engr: Civil & Environ 171L	Engr: Elect & Compu 112	Engr: Mechanical 150B
Engr: Chemical 143	Engr: Civil & Environ 173	Engr: Elect & Compu 116	Engr: Mechanical 151
Engr: Chemical 144	Engr: Civil & Environ 175	Engr: Elect & Compu 118	Engr: Mechanical 152
Engr: Chemical 145A	Engr: Civil & Environ 179	Engr: Elect & Compu 119A	Engr: Mechanical 154
Engr: Chemical 145B	Engr: Civil & Environ 189A	Engr: Elect & Compu 119B	Engr: Mechanical 161
Engr: Chemical 148A	Engr: Civil & Environ 189B	Engr: Elect & Compu 130A	Engr: Mechanical 163
Engr: Chemical 148B	Engr: Civil & Environ 189C	Engr: Elect & Compu 130B	Engr: Mechanical 164
Engr: Chemical 152A	Engr: Civil & Environ 189D	Engr: Elect & Compu 132A	Engr: Mechanical 165
Engr: Chemical 152B	Engr: Civil & Environ 189E	Engr: Elect & Compu 132B	Engr: Mechanical 171
Engr: Chemical 155	Engr: Civil & Environ 189F	Engr: Elect & Compu 132C	Engr: Mechanical 172
Engr: Chemical 155A	Engr: Civil & Environ 189G	Engr: Elect & Compu 133	Engr: Mechanical 185A
Engr: Chemical 155B	Engr: Civil & Environ 189H	Engr: Elect & Compu 134A	Engr: Mechanical 185B
Engr: Chemical 157	Engr: Civil & Environ 189I	Engr: Elect & Compu 134B	Engr: Mechanical 189B
Engr: Chemical 158A †	Engr: Civil & Environ 189J	Engr: Elect & Compu 135	Entomology 1 †
Engr: Chemical 158B	Engr: Civil & Environ 190C	Engr: Elect & Compu 136A	Entomology 2
Engr: Chemical 158C	Engr: Civil & Environ 192	Engr: Elect & Compu 136B	Entomology 10
Engr: Chemical 160	Engr: Civil & Environ 198	Engr: Elect & Compu 140A	Entomology 102
Engr: Chemical 161A	Engr: Civil & Environ 199	Engr: Elect & Compu 140B	Entomology 105
Engr: Chemical 161B	Engr: Computer Science 10	Engr: Elect & Compu 145	Entomology 107
Engr: Chemical 161C †	Engr: Computer Science 12 †	Engr: Elect & Compu 146A	Entomology 109
Engr: Chemical 161L	Engr: Computer Science 15	Engr: Elect & Compu 146B	Entomology 110
Engr: Chemical 166	Engr: Computer Science 20	Engr: Elect & Compu 150A	Entomology 116
Engr: Chemical 170	Engr: Computer Science 30	Engr: Elect & Compu 150B	Entomology 117
Engr: Chemical 190C	Engr: Computer Science 40	Engr: Elect & Compu 152	Entomology 119
Engr: Chemical 192	Engr: Computer Science 50	Engr: Elect & Compu 157A	Entomology 123
Engr: Chemical 198	Engr: Computer Science 60	Engr: Elect & Compu 157B	Entomology 153
Engr: Chemical 199	Engr: Computer Science 89A	Engr: Elect & Compu 160	Entomology 156
Engr: Chemical-Materials 1	Engr: Computer Science 89B	Engr: Elect & Compu 161	Entomology 156L
Engr: Chemical-Materials 5	Engr: Computer Science 89C	Engr: Elect & Compu 165	Entomology 180A
Engr: Chemical-Materials 6	Engr: Computer Science 89D	Engr: Elect & Compu 170	Entomology 180B
Engr: Chemical-Materials 189A	Engr: Computer Science 89E	Engr: Elect & Compu 171	Environmental Horticulture 1
Engr: Chemical-Materials 189B	Engr: Computer Science 89F	Engr: Elect & Compu 172	Environmental Horticulture 6
Engr: Chemical-Materials 189C	Engr: Computer Science 89G	Engr: Elect & Compu 173A	Environmental Horticulture 100
Engr: Chemical-Materials 189D	Engr: Computer Science 89H	Engr: Elect & Compu 173B	Environmental Horticulture 101
Engr: Chemical-Materials 189E	Engr: Computer Science 89I	Engr: Elect & Compu 180A	Environmental Horticulture 102
Engr: Chemical-Materials 189F	Engr: Computer Science 89J	Engr: Elect & Compu 180B	Environmental Horticulture 105
Engr: Chemical-Materials 189G	Engr: Computer Science 89K	Engr: Elect & Compu 181A	Environmental Horticulture 120
Engr: Chemical-Materials 189H	Engr: Computer Science 89L	Engr: Elect & Compu 181B	Environmental Horticulture 125
Engr: Chemical-Materials 189I	Engr: Computer Science 120	Engr: Elect & Compu 183	Environmental Horticulture 133
Engr: Chemical-Materials 189J	Engr: Computer Science 122A	Engr: Elect & Compu 189A	Environmental Horticulture 150
Engr: Chemical-Materials 189K	Engr: Computer Science 122B	Engr: Elect & Compu 189B	Environmental Horticulture 160
Engr: Chemical-Materials 189L	Engr: Computer Science 124	Engr: Elect & Compu 189C	Environmental Horticulture 160L
Engr: Chemical-Materials 189M	Engr: Computer Science 127	Engr: Elect & Compu 189D	Environmental Sci & Management 8 †
Engr: Chemical-Materials 189N	Engr: Computer Science 129	Engr: Elect & Compu 189E	Environmental Sci & Management 30
Engr: Chemical-Materials 189O	Engr: Computer Science 130	Engr: Elect & Compu 189F	Environmental Sci & Management 47
Engr: Chemical-Materials 189P	Engr: Computer Science 132	Engr: Elect & Compu 189G	Environmental Sci & Management 100
Engr: Chemical-Materials 189Q	Engr: Computer Science 140A	Engr: Elect & Compu 189H	Environmental Sci & Management 108
Engr: Chemical-Materials 189R	Engr: Computer Science 140B	Engr: Elect & Compu 189I	Environmental Sci & Management 121
Engr: Chemical-Materials 194HA	Engr: Computer Science 142	Engr: Elect & Compu 189J	Environmental Sci & Management 131
Engr: Chemical-Materials 194HB	Engr: Computer Science 145	Engr: Elect & Compu 189K	Environmental Sci & Management 141
Engr: Chemical-Materials 194HC	Engr: Computer Science 150	Engr: Elect & Compu 189L	Environmental Sci & Management 144
Engr: Civil & Environ 3 †	Engr: Computer Science 152A	Engr: Elect & Compu 189M	Environmental Sci & Management 186
Engr: Civil & Environ 16	Engr: Computer Science 152B	Engr: Elect & Compu 189N	Environmental Sci & Management 194H
Engr: Civil & Environ 17	Engr: Computer Science 152C	Engr: Elect & Compu 189O	Environmental Sci & Management 195 †
Engr: Civil & Environ 19	Engr: Computer Science 153	Engr: Elect & Compu 189P	Environ Science & Policy 1 †
Engr: Civil & Environ 90X	Engr: Computer Science 154A	Engr: Elect & Compu 189Q	Environ Science & Policy 10 †
Engr: Civil & Environ 92	Engr: Computer Science 154B	Engr: Elect & Compu 189R	Environ Science & Policy 30
Engr: Civil & Environ 98	Engr: Computer Science 158	Engr: Elect & Compu 189S	Environ Science & Policy 100
Engr: Civil & Environ 99	Engr: Computer Science 160	Engr: Elect & Compu 189T	Environ Science & Policy 110
Engr: Civil & Environ 114	Engr: Computer Science 163	Engr: Elect & Compu 189U	Environ Science & Policy 111
Engr: Civil & Environ 115	Engr: Computer Science 165A	Engr: Elect & Compu 189V	Environ Science & Policy 116N
Engr: Civil & Environ 119	Engr: Computer Science 165B	Engr: Elect & Compu 190C	Environ Science & Policy 121
Engr: Civil & Environ 123 †	Engr: Computer Science 170	Engr: Elect & Compu 192	Environ Science & Policy 123
Engr: Civil & Environ 125	Engr: Computer Science 171	Engr: Elect & Compu 193A	Environ Science & Policy 124
Engr: Civil & Environ 126	Engr: Computer Science 173	Engr: Elect & Compu 193B	Environ Science & Policy 127
Engr: Civil & Environ 127	Engr: Computer Science 174	Engr: Elect & Compu 195A	Environ Science & Policy 150A

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Environ Science & Policy 150B	Exercise Biology 126	Geology 142	Mathematics 125A
Environ Science & Policy 150C	Exercise Biology 148	Geology 143	Mathematics 125B
Environ Science & Policy 151	Exercise Biology 148L	Geology 144	Mathematics 128A
Environ Science & Policy 151L	Exercise Biology 179	Geology 145	Mathematics 128B
Environ Science & Policy 152	Exercise Biology 194H	Geology 146	Mathematics 128C
Environ Science & Policy 155	Exercise Biology 198	Geology 147	Mathematics 129
Environ Science & Policy 155L	Fiber And Polymer Science 100	Geology 148	Mathematics 133
Environ Science & Policy 163 †	Fiber And Polymer Science 110 †	Geology 149	Mathematics 135A
Environ Science & Policy 170 †	Fiber And Polymer Science 150	Geology 150A	Mathematics 135B
Environ Science & Policy 179L	Fiber And Polymer Science 161	Geology 150B	Mathematics 141
Environ Science & Policy 190	Fiber And Polymer Science 161L	Geology 150C	Mathematics 145
Environ Science & Policy 191A	Fiber And Polymer Science 180A	Geology 152	Mathematics 146
Environ Science & Policy 191B	Fiber And Polymer Science 180B	Geology 156	Mathematics 147
Environmental Toxicology 10	Food Science & Technology 1	Geology 160	Mathematics 148
Environmental Toxicology 20	Food Science & Technology 3	Geology 161	Mathematics 150A
Environmental Toxicology 30	Food Science & Technology 10 †	Geology 162	Mathematics 150B
Environmental Toxicology 92	Food Science & Technology 50	Geology 163	Mathematics 150C
Environmental Toxicology 99	Food Science & Technology 100A	Geology 175	Mathematics 160
Environmental Toxicology 101	Food Science & Technology 100B	Geology 182	Mathematics 165
Environmental Toxicology 102A	Food Science & Technology 101A	Geology 190	Mathematics 167
Environmental Toxicology 102B	Food Science & Technology 101B	Geology 192	Mathematics 168
Environmental Toxicology 103A	Food Science & Technology 102A	Geology 194A	Mathematics 180
Environmental Toxicology 103B	Food Science & Technology 102B	Geology 194B	Mathematics 185A
Environmental Toxicology 104	Food Science & Technology 103	Geology 194HA	Mathematics 185B
Environmental Toxicology 110	Food Science & Technology 104	Geology 194HB	Mathematics 189
Environmental Toxicology 111	Food Science & Technology 104L	Geology 198	Mathematics 194
Environmental Toxicology 120	Food Science & Technology 107	Geology 199	Mathematics 199
Environmental Toxicology 127	Food Science & Technology 109	Global Disease Biology 101	Med: Cell Bio & Human Anat 101
Environmental Toxicology 128	Food Science & Technology 110	Global Disease Biology 102	Med: Cell Bio & Human Anat 101L
Environmental Toxicology 130	Food Science & Technology 110L	Global Disease Biology 103	Med - Public Health Sciences 101 †
Environmental Toxicology 131	Food Science & Technology 117	History 109B †	Med - Public Health Sciences 102
Environmental Toxicology 135	Food Science & Technology 119	Human Development 117	Microbiology 10
Environmental Toxicology 138	Food Science & Technology 123	Hydrologic Science 10 †	Microbiology 91
Environmental Toxicology 146	Food Science & Technology 123L	Hydrologic Science 47	Microbiology 101
Environmental Toxicology 190	Food Science & Technology 127	Hydrologic Science 103N	Microbiology 102
Environmental Toxicology 190C	Food Science & Technology 128	Hydrologic Science 110	Microbiology 104L
Environmental Toxicology 190S	Food Science & Technology 131	Hydrologic Science 124	Microbiology 105
Environmental Toxicology 192	Food Science & Technology 151Y	Hydrologic Science 134	Microbiology 105L
Environmental Toxicology 194HA	Food Science & Technology 160	Hydrologic Science 141	Microbiology 111
Environmental Toxicology 194HB	Food Science & Technology 190	Hydrologic Science 142	Microbiology 115
Environmental Toxicology 194HC	Food Science & Technology 192	Hydrologic Science 143	Microbiology 120
Environmental Toxicology 197T	Food Science & Technology 198	Hydrologic Science 144	Microbiology 140
Environmental Toxicology 198	Food Science & Technology 199	Hydrologic Science 146	Microbiology 150
Environmental Toxicology 199	Geology 1	Hydrologic Science 147	Microbiology 162
Evolution and Ecology 2	Geology 2	Hydrologic Science 151	Microbiology 170
Evolution and Ecology 10	Geology 2G	Hydrologic Science 182	Microbiology 175
Evolution and Ecology 11	Geology 3	Integrated Studies 8A	Microbiology 191
Evolution and Ecology 12	Geology 3G	International Agricultural Dev 142	Molecular and Cellular Biology 10
Evolution and Ecology 13	Geology 3L	International Agricultural Dev 160	Molecular and Cellular Biology 99
Evolution and Ecology 98	Geology 4	Landscape Architecture 1 †	Molecular and Cellular Biology 110Y
Evolution and Ecology 99	Geology 10	Landscape Architecture 50	Molecular and Cellular Biology 120L
Evolution and Ecology 100	Geology 12	Landscape Architecture 60 †	Molecular and Cellular Biology 121
Evolution and Ecology 101	Geology 16	Landscape Architecture 140 †	Molecular and Cellular Biology 123
Evolution and Ecology 102	Geology 16G	Landscape Architecture 142 †	Molecular and Cellular Biology 124
Evolution and Ecology 103	Geology 17	Landscape Architecture 150	Molecular and Cellular Biology 126
Evolution and Ecology 104	Geology 18	Landscape Architecture 180F	Molecular and Cellular Biology 138
Evolution and Ecology 105	Geology 18V	Landscape Architecture 181F	Molecular and Cellular Biology 139
Evolution and Ecology 106	Geology 20	Linguistics 112	Molecular and Cellular Biology 140L
Evolution and Ecology 107	Geology 25	Linguistics 175	Molecular and Cellular Biology 142
Evolution and Ecology 110	Geology 25V	Linguistics 177	Molecular and Cellular Biology 143
Evolution and Ecology 111	Geology 28	Mathematics 12	Molecular and Cellular Biology 144
Evolution and Ecology 114	Geology 30	Mathematics 16A	Molecular and Cellular Biology 145
Evolution and Ecology 115	Geology 32	Mathematics 16B	Molecular and Cellular Biology 148
Evolution and Ecology 119	Geology 35	Mathematics 16C	Molecular and Cellular Biology 150
Evolution and Ecology 138	Geology 36	Mathematics 17A	Molecular and Cellular Biology 158
Evolution and Ecology 141	Geology 50	Mathematics 17B	Molecular and Cellular Biology 160L
Evolution and Ecology 147	Geology 50L	Mathematics 17C	Molecular and Cellular Biology 162
Evolution and Ecology 149	Geology 60	Mathematics 21A	Molecular and Cellular Biology 163
Evolution and Ecology 150	Geology 62	Mathematics 21AH	Molecular and Cellular Biology 164
Evolution and Ecology 161	Geology 91	Mathematics 21AL	Molecular and Cellular Biology 178
Evolution and Ecology 180A	Geology 92	Mathematics 21B	Molecular and Cellular Biology 182
Evolution and Ecology 180B	Geology 98	Mathematics 21BH	Molecular and Cellular Biology 190C
Evolution and Ecology 181	Geology 99	Mathematics 21BL	Molecular and Cellular Biology 191
Evolution and Ecology 189	Geology 101	Mathematics 21C	Molecular and Cellular Biology 192
Evolution and Ecology 190	Geology 101L	Mathematics 21CH	Molecular and Cellular Biology 193
Evolution and Ecology 194HA	Geology 103	Mathematics 21CL	Molecular and Cellular Biology 194
Evolution and Ecology 194HB	Geology 105	Mathematics 21D	Molecular and Cellular Biology 194H
Evolution and Ecology 194HC	Geology 106	Mathematics 21M	Molecular and Cellular Biology 197T
Evolution and Ecology 197T	Geology 107	Mathematics 22A	Molecular and Cellular Biology 198
Evolution and Ecology 199	Geology 107L	Mathematics 22AL	Molecular and Cellular Biology 199
Exercise Biology 10	Geology 108	Mathematics 22B	Native American Studies 123 †
Exercise Biology 90X	Geology 109	Mathematics 25	Nematology 10V
Exercise Biology 101	Geology 109L	Mathematics 67	Nematology 100
Exercise Biology 103	Geology 110	Mathematics 108	Nematology 110
Exercise Biology 104L	Geology 115	Mathematics 111	Neuro, Physio & Behavior 10
Exercise Biology 106	Geology 116N	Mathematics 114	Neuro, Physio & Behavior 14
Exercise Biology 106L	Geology 120	Mathematics 115A	Neuro, Physio & Behavior 15
Exercise Biology 110	Geology 130	Mathematics 115B	Neuro, Physio & Behavior 15V
Exercise Biology 111	Geology 131	Mathematics 116	Neuro, Physio & Behavior 17
Exercise Biology 112	Geology 134	Mathematics 118A	Neuro, Physio & Behavior 100L
Exercise Biology 115	Geology 136	Mathematics 118B	Neuro, Physio & Behavior 101
Exercise Biology 116	Geology 138	Mathematics 118C	Neuro, Physio & Behavior 110A
Exercise Biology 117	Geology 139	Mathematics 119A	Neuro, Physio & Behavior 110B
Exercise Biology 124	Geology 141	Mathematics 119B	Neuro, Physio & Behavior 139
Exercise Biology 125	Geology 141L	Mathematics 124	Neuro, Physio & Behavior 142

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Neuro, Physio & Behavior 159	Physics 160	Science and Society 110	Wild, Fish & Conserv Biol 195
Neuro, Physio & Behavior 161	Physics 185	Science and Society 120 †	
Neuro, Physio & Behavior 163	Physics 190	Science and Society 135S †	
Neuro, Physio & Behavior 167	Physics 194HA	Soil Science 10	
Nutrition 10	Physics 194HB	Soil Science 100	Afr Am & Afr Std 10
Nutrition 11	Physics 195	Soil Science 102	Afr Am & Afr Std 12 †
Nutrition 99	Physics 197T	Soil Science 105	Afr Am & Afr Std 17
Nutrition 104	Physics 198	Soil Science 107	Afr Am & Afr Std 18 †
Nutrition 105	Physics 199	Soil Science 109	Afr Am & Afr Std 107C †
Nutrition 111AY	Plant Biology 10	Soil Science 111	Afr Am & Afr Std 107D †
Nutrition 112	Plant Biology 102	Soil Science 118	Afr Am & Afr Std 110
Nutrition 113	Plant Biology 105	Soil Science 120	Afr Am & Afr Std 111 †
Nutrition 114	Plant Biology 112	Spanish 179 †	Afr Am & Afr Std 123
Nutrition 116A	Plant Biology 116	Spanish 179Y †	Afr Am & Afr Std 130
Nutrition 116AL	Plant Biology 119	Statistics 10	Afr Am & Afr Std 133
Nutrition 116B	Plant Biology 123	Statistics 12	Afr Am & Afr Std 145A
Nutrition 116BL	Plant Biology 126	Statistics 13	Afr Am & Afr Std 145B
Nutrition 117	Plant Biology 143 †	Statistics 13Y	Afr Am & Afr Std 165
Nutrition 118	Plant Biology 148	Statistics 32	Afr Am & Afr Std 172
Nutrition 120AN †	Plant Pathology 123	Statistics 100	Afr Am & Afr Std 176
Nutrition 120BN †	Plant Pathology 148	Statistics 101	Afr Am & Afr Std 177 †
Nutrition 122	Plant Science 1	Statistics 103	Afr Am & Afr Std 178 †
Nutrition 123	Plant Science 2	Statistics 104	Afr Am & Afr Std 180
Nutrition 124	Plant Science 5	Statistics 106	Agricul & Res Econ 1
Nutrition 127	Plant Science 12 †	Statistics 108	Agricul & Res Econ 1S
Nutrition 129	Plant Science 14	Statistics 130A	Agricul & Res Econ 15
Nutrition 130	Plant Science 15	Statistics 130B	Agricul & Res Econ 18
Nutrition 190	Plant Science 21	Statistics 131A	Agricul & Res Econ 98
Nutrition 190C	Plant Science 49	Statistics 131B	Agricul & Res Econ 99
Nutrition 199	Plant Science 100A	Statistics 131C	Agricul & Res Econ 100A
Philosophy 10	Plant Science 100AL	Statistics 135	Agricul & Res Econ 100B
Philosophy 13 †	Plant Science 100B	Statistics 137	Agricul & Res Econ 106
Philosophy 13G †	Plant Science 100BL	Statistics 138	Agricul & Res Econ 107
Philosophy 30 †	Plant Science 100C	Statistics 141	Agricul & Res Econ 112
Philosophy 31 †	Plant Science 100CL	Statistics 144	Agricul & Res Econ 113
Philosophy 32 †	Plant Science 101	Statistics 145	Agricul & Res Econ 115A
Philosophy 38 †	Plant Science 102	Statistics 194HA	Agricul & Res Econ 115B
Philosophy 107 †	Plant Science 105	Statistics 194HB	Agricul & Res Econ 119
Philosophy 108 †	Plant Science 112	Statistics 200A	Agricul & Res Econ 120
Philosophy 189I †	Plant Science 113	Statistics 200B	Agricul & Res Econ 120S
Physics 1A	Plant Science 114	Statistics 200C	Agricul & Res Econ 121
Physics 1B	Plant Science 116	Technocultural Studies 5 †	Agricul & Res Econ 130
Physics 7A	Plant Science 130	Textiles & Clothing 6	Agricul & Res Econ 132
Physics 7B	Plant Science 131	Textiles & Clothing 162	Agricul & Res Econ 135
Physics 7C	Plant Science 141 †	Textiles & Clothing 162L	Agricul & Res Econ 136
Physics 9A	Plant Science 144	Textiles & Clothing 163	Agricul & Res Econ 138
Physics 9B	Plant Science 147	Textiles & Clothing 163L	Agricul & Res Econ 139
Physics 9C	Plant Science 147L	Textiles & Clothing 165	Agricul & Res Econ 140
Physics 9D	Plant Science 150	Textiles & Clothing 171	Agricul & Res Econ 142
Physics 9HA	Plant Science 152	University Writing Program 120 †	Agricul & Res Econ 143
Physics 9HB	Plant Science 153	University Writing Program 121 †	Agricul & Res Econ 144
Physics 9HC	Plant Science 154	VM Molecular Biosciences 101Y	Agricul & Res Econ 145
Physics 9HD	Plant Science 157	VM Pathology, Microbiol & Immun 129Y †	Agricul & Res Econ 146
Physics 9HE	Plant Science 158	Viticulture & Enology 2	Agricul & Res Econ 147
Physics 10	Plant Science 160	Viticulture & Enology 3 †	Agricul & Res Econ 147M
Physics 10C	Plant Science 162	Viticulture & Enology 101A	Agricul & Res Econ 150
Physics 12	Plant Science 170A	Viticulture & Enology 101B	Agricul & Res Econ 155
Physics 30	Plant Science 170B	Viticulture & Enology 101C	Agricul & Res Econ 156
Physics 49	Plant Science 171	Viticulture & Enology 110	Agricul & Res Econ 157
Physics 90X	Plant Science 172	Viticulture & Enology 111	Agricul & Res Econ 165
Physics 98	Plant Science 173	Viticulture & Enology 111L	Agricul & Res Econ 171A
Physics 99	Plant Science 174	Viticulture & Enology 115	Agricul & Res Econ 171B
Physics 102	Plant Science 176	Viticulture & Enology 118	Agricul & Res Econ 175
Physics 104B	Plant Science 178	Viticulture & Enology 123	Agricul & Res Econ 176
Physics 105A	Plant Science 188	Viticulture & Enology 123L	Agricul & Res Econ 190
Physics 105B	Plant Science 190	Viticulture & Enology 124	Agricul & Res Econ 192
Physics 105C	Plant Science 193	Viticulture & Enology 124L	Agricul & Res Econ 194HA
Physics 108	Plant Science 194H	Viticulture & Enology 125	Agricul & Res Econ 194HB
Physics 108L	Plant Science 196	Viticulture & Enology 125L	Agricul & Res Econ 197T
Physics 110A	Political Science 51 †	Viticulture & Enology 126	Agricul & Res Econ 198
Physics 110B	Political Science 114 †	Viticulture & Enology 126L	Agricul & Res Econ 199
Physics 110C	Science & Tech Studies 130A †	Viticulture & Enology 128	American Studies 1B †
Physics 112	Science & Tech Studies 130B †	Viticulture & Enology 128L	American Studies 1C †
Physics 115A	Science & Tech Studies 131 †	Viticulture & Enology 135	American Studies 1E †
Physics 115B	Science and Society 1 †	Viticulture & Enology 140	American Studies 5 †
Physics 116A	Science and Society 2 †	Viticulture & Enology 181	American Studies 10 †
Physics 116B	Science and Society 3 †	Viticulture & Enology 190X	American Studies 25 †
Physics 116C	Science and Society 4 †	Viticulture & Enology 192	American Studies 30 †
Physics 122A	Science and Society 5 †	Viticulture & Enology 199	American Studies 55 †
Physics 122B	Science and Society 7 †	Wild, Fish & Conserv Biol 10	American Studies 59 †
Physics 123	Science and Society 8 †	Wild, Fish & Conserv Biol 11	American Studies 110 †
Physics 129A	Science and Society 9 †	Wild, Fish & Conserv Biol 50	American Studies 120 †
Physics 129B	Science and Society 10 †	Wild, Fish & Conserv Biol 51	American Studies 130 †
Physics 130A	Science and Society 11 †	Wild, Fish & Conserv Biol 100	American Studies 139 †
Physics 130B	Science and Society 12 †	Wild, Fish & Conserv Biol 101	American Studies 151 †
Physics 140A	Science and Society 13 †	Wild, Fish & Conserv Biol 102L	American Studies 152 †
Physics 140B	Science and Society 15 †	Wild, Fish & Conserv Biol 111	American Studies 153 †
Physics 150	Science and Society 18 †	Wild, Fish & Conserv Biol 121	American Studies 154 †
Physics 151	Science and Society 20 †	Wild, Fish & Conserv Biol 130	American Studies 155 †
Physics 152	Science and Society 25 †	Wild, Fish & Conserv Biol 141	American Studies 156 †
Physics 153	Science and Society 25V †	Wild, Fish & Conserv Biol 153	American Studies 157 †
Physics 154	Science and Society 30 †	Wild, Fish & Conserv Biol 154	Animal Science 112 †
Physics 155	Science and Society 40 †	Wild, Fish & Conserv Biol 155	Animal Science 141
Physics 156	Science and Society 42 †	Wild, Fish & Conserv Biol 156	Animal Science 148
Physics 157	Science and Society 70A †	Wild, Fish & Conserv Biol 157	Animal Science 170

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

## Social Sciences (SS)

Anthropology 2	Asian American Studies 189G	Dramatic Art 114 †	History 8 †
Anthropology 3 †	Asian American Studies 189H †	Dramatic Art 144 †	History 9A †
Anthropology 4	Asian American Studies 189I †	Dramatic Art 144A †	History 9B †
Anthropology 20 †	Chicano Studies 10 †	Dramatic Art 144B †	History 10A †
Anthropology 23	Chicano Studies 23 †	Economics 1A	History 10B †
Anthropology 24	Chicano Studies 30	Economics 1B	History 10C †
Anthropology 25	Chicano Studies 100	Economics 110A	History 12 †
Anthropology 26	Chicano Studies 110	Economics 110B	History 15 †
Anthropology 28	Chicano Studies 111	Economics 111A	History 17A †
Anthropology 29	Chicano Studies 112	Economics 111B	History 17B †
Anthropology 30 †	Chicano Studies 113	Economics 115A	History 72A †
Anthropology 32	Chicano Studies 114	Economics 115B	History 72B †
Anthropology 34	Chicano Studies 114S	Economics 121A	History 80 †
Anthropology 100	Chicano Studies 120	Economics 162	History 85 †
Anthropology 101	Chicano Studies 121	Education 81	History 102S †
Anthropology 103	Chicano Studies 122	Education 100	History 105 †
Anthropology 104N	Chicano Studies 122S	Education 110	History 108 †
Anthropology 105	Chicano Studies 123	Education 115	History 109A †
Anthropology 109	Chicano Studies 125S	Education 119	History 109B †
Anthropology 110	Chicano Studies 130	Education 120	History 110 †
Anthropology 117	Chicano Studies 131	Education 121	History 110A †
Anthropology 120	Chicano Studies 131S	Education 122	History 111A †
Anthropology 121	Chicano Studies 150 †	Education 130	History 111B †
Anthropology 122A	Chicano Studies 161 †	Education 142	History 111C †
Anthropology 122B	Chicano Studies 181 †	Education 150	History 112A †
Anthropology 123AN	Chicano Studies 182	Education 152 †	History 112B †
Anthropology 125A	Chicano Studies 184	Education 173	History 112C
Anthropology 125B	Chicano Studies 184S	Education 181	History 113 †
Anthropology 126A	Chinese 7 †	Education 183	History 115A †
Anthropology 126B	Chinese 134 †	Education 185	History 115B †
Anthropology 127	Cinema & Technocultural Stud 40A †	Education 245	History 115C †
Anthropology 128A	Cinema & Technocultural Stud 40B †	Engineering 2 †	History 115D †
Anthropology 128B	Cinema & Technocultural Stud 150 †	Engineering 10 †	History 115E †
Anthropology 129	Cinema & Technocultural Stud 162 †	Engineering 106 †	History 115F †
Anthropology 130A	Cinema & Technocultural Stud 172 †	Engineering 188	History 116 †
Anthropology 130BN	Communication 3	Engineering 190	History 119
Anthropology 131	Communication 5 †	Engr: Aerospace Sci 10 †	History 120
Anthropology 132	Communication 10Y	Engr: Chemical 80 †	History 121A †
Anthropology 134 †	Communication 76	Engr: Chemical 158A †	History 121B †
Anthropology 136	Communication 101	Engr: Chemical 161C †	History 121C †
Anthropology 138	Communication 102	Engr: Civil & Environ 3 †	History 122 †
Anthropology 139AN	Communication 110	Engr: Civil & Environ 123 †	History 125 †
Anthropology 139BN	Communication 111	Engr: Civil & Environ 137 †	History 130A †
Anthropology 140A	Communication 112	Engr: Civil & Environ 155 †	History 130B †
Anthropology 140B	Communication 114	Engr: Civil & Environ 163 †	History 130C †
Anthropology 141B	Communication 120	Engr: Civil & Environ 165 †	History 131A †
Anthropology 142	Communication 121	Engr: Civil & Environ 190	History 131B †
Anthropology 143A	Communication 122	Engr: Computer Science 188	History 131C †
Anthropology 144	Communication 123	English 172 †	History 132 †
Anthropology 145 †	Communication 130	Entomology 1 †	History 133 †
Anthropology 146N	Communication 131	Environmental Sci & Management 8 †	History 134A †
Anthropology 148A	Communication 136	Environmental Sci & Management 195 †	History 135A †
Anthropology 149A	Communication 139	Environ Science & Policy 1 †	History 135B †
Anthropology 149B	Communication 140	Environ Science & Policy 10 †	History 136 †
Anthropology 170	Communication 141	Environ Science & Policy 101	History 138A †
Anthropology 172	Communication 142	Environ Science & Policy 105	History 138B †
Anthropology 173	Communication 143	Environ Science & Policy 160	History 138C †
Anthropology 174	Communication 144	Environ Science & Policy 161	History 139A †
Anthropology 175	Communication 145	Environ Science & Policy 162	History 139B †
Anthropology 176	Communication 146	Environ Science & Policy 163 †	History 140 †
Anthropology 177	Communication 148	Environ Science & Policy 164	History 141 †
Anthropology 178	Communication 161	Environ Science & Policy 166N	History 142A †
Anthropology 179	Communication 165	Environ Science & Policy 167	History 142B †
Anthropology 184	Communication 170	Environ Science & Policy 168A	History 143 †
Anthropology 185	Communication 170V	Environ Science & Policy 168B	History 144A †
Anthropology 186A †	Communication 172	Environ Science & Policy 169	History 144B †
Arabic 101A †	Communication 174	Environ Science & Policy 170 †	History 145 †
Art History 120A †	Communication 176	Environ Science & Policy 171	History 146A †
Art History 154 †	Communication 180	Environ Science & Policy 172	History 146B †
Art History 155 †	Communication 189A	Environ Science & Policy 173	History 147A †
Asian American Studies 1 †	Communication 189B	Environ Science & Policy 175	History 147B †
Asian American Studies 2 †	Communication 189C	Environ Science & Policy 178	History 147C †
Asian American Studies 3	Communication 189D	Environ Science & Policy 179	History 148A †
Asian American Studies 100 †	Communication 194H	Exercise Biology 102	History 148B †
Asian American Studies 112 †	Comm & Reg Devlpmnt 1	Exercise Biology 120	History 148C †
Asian American Studies 113 †	Comm & Reg Devlpmnt 2	Fiber And Polymer Science 110 †	History 149 †
Asian American Studies 114	Comm & Reg Devlpmnt 20	Food Science & Technology 10 †	History 151A †
Asian American Studies 115	Comm & Reg Devlpmnt 118	Food Science & Technology 55 †	History 151B †
Asian American Studies 116 †	Comm & Reg Devlpmnt 140	Food Science & Technology 159 † ..	History 151C †
Asian American Studies 131	Comm & Reg Devlpmnt 141	French 109	History 151D †
Asian American Studies 132	Comm & Reg Devlpmnt 142	French 160 †	History 159 †
Asian American Studies 141 †	Comm & Reg Devlpmnt 147	French 161 †	History 160 †
Asian American Studies 150	Comm & Reg Devlpmnt 149	French 162 †	History 161 †
Asian American Studies 150B †	Comm & Reg Devlpmnt 151	Geology 81	History 162 †
Asian American Studies 150C †	Comm & Reg Devlpmnt 152	Geology 181	History 163A †
Asian American Studies 150D †	Comm & Reg Devlpmnt 153A	Geology 183	History 163B †
Asian American Studies 150E †	Comm & Reg Devlpmnt 153B	History 1	History 164 †
Asian American Studies 150F †	Comm & Reg Devlpmnt 153C	History 3 †	History 165 †
Asian American Studies 155	Comm & Reg Devlpmnt 154	History 4A †	History 166A †
Asian American Studies 189A	Comm & Reg Devlpmnt 156	History 4B †	History 166B †
Asian American Studies 189B †	Comm & Reg Devlpmnt 157	History 4C †	History 167 †
Asian American Studies 189C	Comm & Reg Devlpmnt 164	History 6 †	History 168 †
Asian American Studies 189D	Comm & Reg Devlpmnt 176	History 7A †	History 169A †
Asian American Studies 189E †	Comm & Reg Devlpmnt 180	History 7B †	History 169B †
Asian American Studies 189F	Consumer Sciences 100	History 7C †	History 170A †

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

History 170B †	Linguistics 5 †	Political Science 5	Psychology 158
History 170C †	Linguistics 6	Political Science 7	Psychology 162
History 171A †	Linguistics 15 †	Political Science 51 †	Psychology 168
History 171B †	Linguistics 127 †	Political Science 100	Psychology 175
History 171BF †	Linguistics 150 †	Political Science 102	Psychology 185
History 171D †	Linguistics 160	Political Science 104	Religious Studies 1E †
History 172 †	Linguistics 163	Political Science 105	Religious Studies 60 †
History 173 †	Linguistics 165	Political Science 106	Religious Studies 67 †
History 174A †	Linguistics 166	Political Science 107	Religious Studies 100 †
History 174B †	Linguistics 171	Political Science 108	Religious Studies 131 †
History 174C †	Linguistics 173	Political Science 109	Religious Studies 134 †
History 174D †	Linguistics 180	Political Science 110	Religious Studies 154 †
History 175 †	Linguistics 182	Political Science 112 †	Religious Studies 161B †
History 176A †	Management 11A	Political Science 113 †	Religious Studies 163 †
History 176B †	Management 11B	Political Science 114 †	Religious Studies 166
History 177A †	Management 12Y	Political Science 115 †	Science & Tech Studies 1
History 177B †	Management 120	Political Science 116 †	Science & Tech Studies 20
History 178A †	Management 140	Political Science 117	Science & Tech Studies 32
History 178B †	Management 150	Political Science 118A †	Science & Tech Studies 40A †
History 179 †	Management 160	Political Science 118B †	Science & Tech Studies 40B †
History 180AN †	Management 170	Political Science 118C †	Science & Tech Studies 98
History 180BN †	Management 180	Political Science 119 †	Science & Tech Studies 108
History 181 †	Management Work Prof Bay Area 11A	Political Science 120	Science & Tech Studies 109
History 182 †	Management Work Prof Bay Area 11B	Political Science 121	Science & Tech Studies 121
History 183A †	Management Work Prof Bay Area 120	Political Science 122	Science & Tech Studies 129
History 183B †	Management Work Prof Bay Area 140	Political Science 123	Science & Tech Studies 150
History 184 †	Management Work Prof Bay Area 150	Political Science 124	Science & Tech Studies 151 †
History 185A †	Management Work Prof Bay Area 160	Political Science 126	Science & Tech Studies 160 †
History 185B †	Management Work Prof Bay Area 170	Political Science 129	Science & Tech Studies 161
History 188	Management Work Prof Bay Area 180	Political Science 130	Science & Tech Studies 162 †
History 189 †	Management Working Profession 11A	Political Science 131	Science & Tech Studies 163
History 190A †	Management Working Profession 11B	Political Science 132	Science & Tech Studies 165
History 190B †	Management Working Profession 120	Political Science 135	Science & Tech Studies 172 †
History 190C †	Management Working Profession 140	Political Science 136	Science & Tech Studies 175
History 190D †	Management Working Profession 150	Political Science 137	Science & Tech Studies 176
History 191A †	Management Working Profession 160	Political Science 140A	Science and Society 1 †
History 191B †	Management Working Profession 170	Political Science 140B	Science and Society 2 †
History 191C †	Management Working Profession 180	Political Science 140C	Science and Society 3 †
History 191D †	Med - Public Health Sciences 101 †	Political Science 140D	Science and Society 4 †
History 191E †	Med - Public Health Sciences 105	Political Science 140E	Science and Society 5 †
History 191F †	Med - Public Health Sciences 132	Political Science 142A	Science and Society 7 †
History 193A †	Med - Public Health Sciences 175W	Political Science 142B	Science and Society 7V
History 193B †	Middle East/S. Asian Std 100 †	Political Science 142C	Science and Society 8 †
History 193C †	Middle East/S. Asian Std 111A †	Political Science 143A	Science and Society 9 †
History 193D †	Middle East/S. Asian Std 131C	Political Science 143B	Science and Society 10 †
History 194A †	Middle East/S. Asian Std 150 †	Political Science 144A	Science and Society 11 †
History 194B †	Middle East/S. Asian Std 180 †	Political Science 144B	Science and Society 12 †
History 194C †	Middle East/S. Asian Std 181A †	Political Science 146A	Science and Society 13 †
History 194D †	Middle East/S. Asian Std 181B †	Political Science 146B	Science and Society 15 †
History 194E †	Middle East/S. Asian Std 181C †	Political Science 147A	Science and Society 18 †
History 195B †	Native American Studies 1	Political Science 147B	Science and Society 20 †
History 196A †	Native American Studies 7 †	Political Science 147C	Science and Society 25 †
History 196B †	Native American Studies 10 †	Political Science 147D	Science and Society 25V †
Human Development 12	Native American Studies 12 †	Political Science 148A	Science and Society 30 †
Human Development 102	Native American Studies 33 †	Political Science 148B	Science and Society 70A †
Human Development 103	Native American Studies 101 †	Political Science 148C	Science and Society 120 †
Human Development 120	Native American Studies 108 †	Political Science 150	Science and Society 121
Human Development 161	Native American Studies 110A	Political Science 151	Science and Society 1355 †
Human Rights 1 †	Native American Studies 110B	Political Science 152	Sociology 1
Human Rights 120A †	Native American Studies 110C	Political Science 153	Sociology 2
Human Rights 130 †	Native American Studies 110D	Political Science 154	Sociology 3
Human Rights 131 †	Native American Studies 115 †	Political Science 155	Sociology 4
Human Rights 134 †	Native American Studies 118	Political Science 160	Sociology 5
Human Rights 136 †	Native American Studies 119	Political Science 162	Sociology 11
Human Rights 161 †	Native American Studies 121	Political Science 163	Sociology 25
Humanities 3 †	Native American Studies 122	Political Science 164	Sociology 30A
Humanities 15 †	Native American Studies 123 †	Political Science 165	Sociology 30B
Hydrologic Science 10 †	Native American Studies 125 †	Political Science 166	Sociology 46A
Hydrologic Science 150	Native American Studies 130A	Political Science 168	Sociology 46B
Integrated Studies 8C	Native American Studies 130B	Political Science 170	Sociology 90X
International Agricultural Dev 10	Native American Studies 130C	Political Science 171	Sociology 100
International Agricultural Dev 103	Native American Studies 133A †	Political Science 172	Sociology 102
International Relations 1	Native American Studies 133B †	Political Science 174	Sociology 103
International Relations 104	Native American Studies 134	Political Science 175	Sociology 104
International Relations 192	Native American Studies 135 †	Political Science 176	Sociology 106
International Relations 194HA	Native American Studies 146	Political Science 179	Sociology 118
International Relations 194HB	Native American Studies 161	Political Science 180	Sociology 120
Italian 107 †	Native American Studies 162	Political Science 183	Sociology 122
Italian 107S †	Native American Studies 180 †	Political Science 187	Sociology 123
Italian 108 †	Native American Studies 184 †	Political Science 190	Sociology 124
Italian 108S †	Native American Studies 191 †	Political Science 192A	Sociology 125
Japanese 25 †	Nutrition 120AN †	Political Science 192B	Sociology 126
Jewish Studies 10	Nutrition 120BN †	Political Science 193	Sociology 128
Jewish Studies 121	Philosophy 13 †	Political Science 193W	Sociology 129
Landscape Architecture 1 †	Philosophy 17	Political Science 194HA	Sociology 130
Landscape Architecture 2	Philosophy 104	Political Science 194HB	Sociology 131
Landscape Architecture 3	Philosophy 109 †	Political Science 195	Sociology 132
Landscape Architecture 10 †	Physical Education 120	Political Science 196A	Sociology 133
Landscape Architecture 141 †	Plant Biology 143 †	Political Science 196B	Sociology 134
Landscape Architecture 142 †	Plant Science 12 †	Political Science 196C	Sociology 135
Landscape Architecture 180G	Plant Science 141 †	Political Science 196D	Sociology 137
Landscape Architecture 180J	Political Science 1	Political Science 196E	Sociology 138
Landscape Architecture 180K	Political Science 2	Portuguese 111	Sociology 139
Linguistics 1 †	Political Science 3	Psychology 1	Sociology 140
Linguistics 1Y †	Political Science 4 †	Psychology 142	

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Sociology 141	Sociology 175	Spanish 116S	Women's Studies 104 †
Sociology 143A	Sociology 176	Spanish 118	Women's Studies 130 †
Sociology 143B	Sociology 180A	Spanish 178A †	Women's Studies 136 †
Sociology 144	Sociology 180B	Spanish 179 †	Women's Studies 137 †
Sociology 145A	Sociology 181	Spanish 179Y †	Women's Studies 138 †
Sociology 145B	Sociology 182	Spanish 180 †	Women's Studies 139 †
Sociology 146	Sociology 183	Technocultural Studies 160 †	Women's Studies 140
Sociology 147	Sociology 185	Textiles & Clothing 7 †	Women's Studies 145 †
Sociology 148	Sociology 185Y	Textiles & Clothing 8	Women's Studies 146 †
Sociology 149	Sociology 188	Textiles & Clothing 107	Women's Studies 148 †
Sociology 150	Sociology 189	Textiles & Clothing 164	Women's Studies 158 †
Sociology 151	Sociology 190X	Textiles & Clothing 173	Women's Studies 165 †
Sociology 152	Sociology 191	Textiles & Clothing 174	Women's Studies 170 †
Sociology 153	Sociology 193	Textiles & Clothing 180A	Women's Studies 175 †
Sociology 154	Sociology 194HA	Textiles & Clothing 180B	Women's Studies 182 †
Sociology 155	Sociology 194HB	VM Pathology, Microbiol & Immun 129Y †	Women's Studies 184
Sociology 156	Sociology 195	Viticulture & Enology 3 †	Women's Studies 185 †
Sociology 157	Spanish 22V †	Washington Center 175	Women's Studies 187
Sociology 159	Spanish 111N	Washington Center 193	Women's Studies 189 †
Sociology 160	Spanish 112N	Women's Studies 20 †	Women's Studies 190 †
Sociology 170	Spanish 113	Women's Studies 50 †	Women's Studies 191 †
Sociology 171	Spanish 114N	Women's Studies 60 †	Women's Studies 193 †
Sociology 172	Spanish 115 †	Women's Studies 70 †	Women's Studies 194HA †
Sociology 173	Spanish 115S †	Women's Studies 102 †	Women's Studies 194HB †
Sociology 174	Spanish 116	Women's Studies 103 †	Women's Studies 195 †

## CORE LITERACIES

These courses satisfy the GE requirement for Core Literacies.

### American Cultures, Governance, and History (ACGH)

Afr Am & Afr Std 10  
Afr Am & Afr Std 15  
Afr Am & Afr Std 50  
Afr Am & Afr Std 100  
Afr Am & Afr Std 123  
Afr Am & Afr Std 133  
Afr Am & Afr Std 165  
Afr Am & Afr Std 172  
Agricul & Res Econ 146

American Studies 1A

American Studies 1B

American Studies 1C

American Studies 1E

American Studies 10

American Studies 21

American Studies 25

American Studies 30

American Studies 55

American Studies 59

American Studies 110

American Studies 120

American Studies 130

American Studies 139

American Studies 151

American Studies 152

American Studies 153

American Studies 154

American Studies 155

American Studies 156

American Studies 157

American Studies 158

Anthropology 2

Anthropology 20

Anthropology 30

Anthropology 103

Anthropology 104N

Anthropology 120

Anthropology 122A

Anthropology 139AN

Anthropology 139BN

Anthropology 141B

Anthropology 176

Anthropology 186A

Art History 186

Art History 188A

Art History 188B

Art History 188C

Asian American Studies 1

Asian American Studies 2

Asian American Studies 3

Asian American Studies 4

Asian American Studies 100

Asian American Studies 112

Asian American Studies 113

Asian American Studies 114

Asian American Studies 115

Asian American Studies 116

Asian American Studies 121

Asian American Studies 130

Asian American Studies 131

Asian American Studies 141

Asian American Studies 150

Asian American Studies 150B

Asian American Studies 150C

Asian American Studies 150D

Asian American Studies 150E

Asian American Studies 150F

Asian American Studies 155

Asian American Studies 189A

Asian American Studies 189D

Asian American Studies 189E

Asian American Studies 189I

Chicano Studies 10

Chicano Studies 30

Chicano Studies 50

Chicano Studies 60

Chicano Studies 70

Chicano Studies 73

Chicano Studies 100

Chicano Studies 110

Chicano Studies 111

Chicano Studies 112

Chicano Studies 113

Chicano Studies 114

Chicano Studies 114S

Chicano Studies 120

Chicano Studies 121

Chicano Studies 123

Chicano Studies 130

Chicano Studies 131

Chicano Studies 132

Chicano Studies 140A

Chicano Studies 150

Chicano Studies 154

Chicano Studies 155

Chicano Studies 156

Chicano Studies 184

Chicano Studies 184S

Cinema & Technocultural Stud 162

Cinema & Technocultural Stud 172

Classics 25

Communication 142

Communication 143

Communication 145

Comm & Reg Devlpmnt 1

Comm & Reg Devlpmnt 2

Comm & Reg Devlpmnt 151

Comm & Reg Devlpmnt 152

Comm & Reg Devlpmnt 154

Comm & Reg Devlpmnt 157

Comm & Reg Devlpmnt 164

Comm & Reg Devlpmnt 176

Dramatic Art 150

Economics 1A

Economics 1B

Economics 121B

Education 100

Education 120

Education 147

Engr: Civil & Environ 123

Engr: Civil & Environ 137

English 120

English 142

English 143

English 144

English 146

English 147

English 158A

English 166

English 167

English 168

English 172

English 175

English 179

English 181A

English 181B

English 182

Environ Science & Policy 172

Film Studies 45

Film Studies 120

Film Studies 124

Food Science & Technology 55

German 45

German 117

History 17A

History 17B

History 72A

History 72B

History 80

History 105

History 169B

History 170A

History 170B

History 170C

History 171A

History 171B

History 171D

History 172

History 173

History 174A

History 174B

History 174C

History 174D

History 175

History 176A

History 176B

History 177A

History 177B

History 178A

History 178B

History 179

History 180AN

History 180BN

History 181

History 182

History 183A

History 183B

History 184

Women's Studies 104 †

Women's Studies 130 †

Women's Studies 136 †

Women's Studies 137 †

Women's Studies 138 †

Women's Studies 139 †

Women's Studies 140

Women's Studies 145 †

Women's Studies 146 †

Women's Studies 148 †

Women's Studies 158 †

Women's Studies 165 †

Women's Studies 170 †

Women's Studies 175 †

Women's Studies 190 †

Women's Studies 191 †

Women's Studies 193 †

Women's Studies 194HA †

Women's Studies 194HB †

Women's Studies 195 †

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Political Science 168	Afr Am & Afr Std 169	Chicano Studies 170	Native American Studies 115
Political Science 172	Afr Am & Afr Std 170	Chicano Studies 181	Native American Studies 118
Political Science 176	Afr Am & Afr Std 172	Chicano Studies 182	Native American Studies 121
Political Science 180	Afr Am & Afr Std 175A	Chicano Studies 184	Native American Studies 122
Political Science 183	Afr Am & Afr Std 175B	Chicano Studies 184S	Native American Studies 123
Political Science 192A	Afr Am & Afr Std 181	Communication 111	Native American Studies 130A
Political Science 192B	Afr Am & Afr Std 185	Communication 123	Native American Studies 130B
Political Science 195	American Studies 1A	Comm & Reg Devlpmnt 1	Native American Studies 130C
Political Science 196A	American Studies 1B	Comm & Reg Devlpmnt 2	Native American Studies 134
Psychology 158	American Studies 1C	Comm & Reg Devlpmnt 147	Native American Studies 135
Religious Studies 1	American Studies 1E	Comm & Reg Devlpmnt 149	Native American Studies 146
Religious Studies 15Y	American Studies 10	Comm & Reg Devlpmnt 151	Native American Studies 161
Religious Studies 23	American Studies 21	Comm & Reg Devlpmnt 152	Native American Studies 162
Religious Studies 106	American Studies 25	Comm & Reg Devlpmnt 154	Native American Studies 180
Religious Studies 111	American Studies 30	Comm & Reg Devlpmnt 157	Native American Studies 181A
Religious Studies 145	American Studies 55	Comm & Reg Devlpmnt 164	Native American Studies 181B
Science & Tech Studies 108	American Studies 59	Comm & Reg Devlpmnt 176	Native American Studies 181C
Science & Tech Studies 150	American Studies 110	Design 40A	Native American Studies 185
Science & Tech Studies 160	American Studies 120	Design 40C	Native American Studies 188
Science & Tech Studies 162	American Studies 130	Dramatic Art 1	Native American Studies 191
Science & Tech Studies 172	American Studies 139	Dramatic Art 5	Philosophy 7Y
Sociology 1	American Studies 151	Dramatic Art 55	Political Science 102
Sociology 2	American Studies 152	Dramatic Art 144A	Political Science 150
Sociology 3	American Studies 153	Dramatic Art 144B	Political Science 151
Sociology 4	American Studies 154	Dramatic Art 144C	Political Science 152
Sociology 5	American Studies 155	Dramatic Art 150	Political Science 153
Sociology 30A	American Studies 156	Dramatic Art 155	Political Science 160
Sociology 30B	American Studies 157	Dramatic Art 156AN	Political Science 162
Sociology 102	Anthropology 2	Dramatic Art 159	Political Science 163
Sociology 123	Anthropology 20	Education 100	Political Science 164
Sociology 129	Anthropology 30	Education 147	Political Science 166
Sociology 130	Anthropology 103	Education 150	Political Science 168
Sociology 131	Anthropology 104N	Engr: Civil & Environ 123	Political Science 172
Sociology 132	Anthropology 120	English 120	Political Science 176
Sociology 134	Anthropology 122A	English 143	Psychology 157
Sociology 137	Anthropology 139AN	English 146	Psychology 158
Sociology 138	Anthropology 139BN	English 147	Religious Studies 1
Sociology 139	Anthropology 141B	English 158B	Religious Studies 1F
Sociology 140	Anthropology 176	English 179	Religious Studies 15Y
Sociology 149	Anthropology 186A	English 181A	Religious Studies 23
Sociology 153	Art History 25	English 181B	Religious Studies 145
Sociology 160	Art History 120A	Film Studies 45	Science & Tech Studies 150
Sociology 172	Art History 188A	Film Studies 120	Science and Society 25V
Sociology 183	Asian American Studies 1	Film Studies 124	Science and Society 41
Spanish 147	Asian American Studies 2	Food Science & Technology 55	Sociology 1
Spanish 174	Asian American Studies 3	German 45	Sociology 2
Spanish 176	Asian American Studies 4	German 117	Sociology 3
Spanish 177	Asian American Studies 100	History 11	Sociology 4
Technocultural Studies 155	Asian American Studies 112	History 17A	Sociology 30A
Technocultural Studies 158	Asian American Studies 113	History 17B	Sociology 30B
Technocultural Studies 159	Asian American Studies 114	History 72A	Sociology 102
Technocultural Studies 160	Asian American Studies 115	History 72B	Sociology 123
University Writing Program 102M	Asian American Studies 116	History 169B	Sociology 129
Washington Center 175	Asian American Studies 121	History 170C	Sociology 130
Women's Studies 20	Asian American Studies 130	History 171A	Sociology 131
Women's Studies 50	Asian American Studies 131	History 171B	Sociology 132
Women's Studies 60	Asian American Studies 141	History 173	Sociology 134
Women's Studies 70	Asian American Studies 150	History 174A	Sociology 137
Women's Studies 103	Asian American Studies 150B	History 174B	Sociology 140
Women's Studies 104	Asian American Studies 150C	History 174C	Sociology 149
Women's Studies 130	Asian American Studies 150D	History 176B	Sociology 153
Women's Studies 136	Asian American Studies 150E	History 177A	Sociology 160
Women's Studies 137	Asian American Studies 150F	History 177B	Sociology 172
Women's Studies 139	Asian American Studies 155	History 178A	Spanish 147
Women's Studies 140	Asian American Studies 189A	History 178B	Spanish 174
Women's Studies 146	Asian American Studies 189D	History 179	Spanish 176
Women's Studies 158	Asian American Studies 189E	History 182	Spanish 177
Women's Studies 162	Asian American Studies 189I	History 184	Spanish 178A
Women's Studies 165	Chicano Studies 10	History 188	Technocultural Studies 155
Women's Studies 170	Chicano Studies 30	History 189	Women's Studies 20
Women's Studies 175	Chicano Studies 50	Human Development 12	Women's Studies 50
Women's Studies 180	Chicano Studies 60	Human Development 103	Women's Studies 60
Women's Studies 187	Chicano Studies 70	Human Rights 120A	Women's Studies 70
Women's Studies 190	Chicano Studies 73	Landscape Architecture 141	Women's Studies 102
Women's Studies 191	Chicano Studies 100	Landscape Architecture 180J	Women's Studies 103
Women's Studies 193	Chicano Studies 110	Landscape Architecture 180K	Women's Studies 104
Women's Studies 195	Chicano Studies 111	Landscape Architecture 181J	Women's Studies 130
	Chicano Studies 112	Landscape Architecture 181K	Women's Studies 136
	Chicano Studies 113	Linguistics 6	Women's Studies 137
	Chicano Studies 114	Linguistics 163	Women's Studies 138
	Chicano Studies 114S	Med - Public Health Sciences 105	Women's Studies 139
	Chicano Studies 120	Music 28	Women's Studies 140
	Chicano Studies 121	Music 105	Women's Studies 146
	Chicano Studies 123	Music 110F	Women's Studies 148
	Chicano Studies 130	Music 126	Women's Studies 158
	Chicano Studies 131	Music 129A	Women's Studies 162
	Chicano Studies 132	Native American Studies 1	Women's Studies 165
	Chicano Studies 140A	Native American Studies 5	Women's Studies 170
	Chicano Studies 141	Native American Studies 7	Women's Studies 175
	Chicano Studies 150	Native American Studies 10	Women's Studies 180
	Chicano Studies 154	Native American Studies 12	Women's Studies 187
	Chicano Studies 155	Native American Studies 33	Women's Studies 190
	Chicano Studies 156	Native American Studies 34	Women's Studies 191
	Chicano Studies 157	Native American Studies 101	Women's Studies 193
	Chicano Studies 161	Native American Studies 108	Women's Studies 195

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

## Domestic Diversity (DD)

Afr Am & Afr Std 10  
Afr Am & Afr Std 15  
Afr Am & Afr Std 50  
Afr Am & Afr Std 51  
Afr Am & Afr Std 100  
Afr Am & Afr Std 123  
Afr Am & Afr Std 130  
Afr Am & Afr Std 133  
Afr Am & Afr Std 145B  
Afr Am & Afr Std 152  
Afr Am & Afr Std 156  
Afr Am & Afr Std 165  
Afr Am & Afr Std 168

**Oral Skills (OL)**

Animal Science 18  
 Animal Science 21  
 Animal Science 22A  
 Animal Science 22B  
 Animal Science 112  
 Animal Science 123  
 Animal Science 142  
 Animal Science 144  
 Animal Science 146  
 Animal Science 148  
 Animal Science 194HA  
 Anthropology 5  
 Anthropology 13  
 Anthropology 103  
 Anthropology 154CL  
 Anthropology 158  
 Anthropology 183  
 Anthropology 186A  
 Applied Biological System Tech 15  
 Applied Biological System Tech 163  
 Arabic 101A  
 Art History 190A  
 Art History 190B  
 Art History 190C  
 Art History 190D  
 Art History 190E  
 Art History 190F  
 Art History 190G  
 Art History 190H  
 Art History 190I  
 Art History 190J  
 Art History 190K  
 Art History 190L  
 Asian American Studies 4  
 Asian American Studies 115  
 Asian American Studies 116  
 Asian American Studies 121  
 Asian American Studies 130  
 Asian American Studies 141  
 Asian American Studies 150E  
 Asian American Studies 150F  
 Asian American Studies 189E  
 Asian American Studies 189I  
 Atmospheric Science 110  
 Atmospheric Science 111Y  
 Biological Sciences 2C  
 Biological Sciences 122  
 Biological Sciences 124  
 Biological Sciences 134  
 Biotechnology 188  
 Chicano Studies 10  
 Chicano Studies 21  
 Chicano Studies 21S  
 Chicano Studies 23  
 Chicano Studies 30  
 Chicano Studies 73  
 Chicano Studies 110  
 Chicano Studies 112  
 Chicano Studies 120  
 Chicano Studies 121  
 Chicano Studies 122S  
 Chicano Studies 123  
 Chicano Studies 125S  
 Chicano Studies 131  
 Chicano Studies 131S  
 Chicano Studies 132  
 Chicano Studies 135S  
 Chicano Studies 145S  
 Chicano Studies 147S  
 Chicano Studies 154  
 Chicano Studies 155  
 Chicano Studies 156  
 Chicano Studies 172  
 Chicano Studies 182  
 Chicano Studies 184  
 Chicano Studies 184S  
 Chicano Studies 192  
 Chicano Studies 194HA  
 Chicano Studies 194HB  
 Chicano Studies 194HC  
 Chinese 1  
 Chinese 1A  
 Chinese 1BL  
 Chinese 1CN  
 Chinese 2  
 Chinese 2BL  
 Chinese 2CN  
 Chinese 3  
 Chinese 3BL  
 Chinese 3CN  
 Chinese 4  
 Chinese 4A  
 Chinese 5

Chinese 6  
 Chinese 7  
 Chinese 111  
 Chinese 11A  
 Chinese 112  
 Chinese 113  
 Chinese 120  
 Chinese 134  
 Chinese 150  
 Cinema & Technocultural Stud 40A  
 Cinema & Technocultural Stud 40B  
 Cinema & Technocultural Stud 41A  
 Cinema & Technocultural Stud 41B  
 Cinema & Technocultural Stud 124E  
 Cinema & Technocultural Stud 146A  
 Cinema & Technocultural Stud 150  
 Cinema & Technocultural Stud 162  
 Communication 1  
 Communication 5  
 Comm & Reg Devlpmnt 1  
 Comm & Reg Devlpmnt 20  
 Comm & Reg Devlpmnt 147  
 Comm & Reg Devlpmnt 149  
 Comm & Reg Devlpmnt 151  
 Comm & Reg Devlpmnt 153A  
 Comm & Reg Devlpmnt 154  
 Comm & Reg Devlpmnt 164  
 Comparative Literature 53A  
 Comparative Literature 53B  
 Comparative Literature 53C  
 Comparative Literature 155  
 Comparative Literature 162  
 Dramatic Art 2  
 Dramatic Art 5  
 Dramatic Art 10  
 Dramatic Art 21A  
 Dramatic Art 111  
 Dramatic Art 120  
 Dramatic Art 121A  
 Dramatic Art 121B  
 Dramatic Art 121C  
 Dramatic Art 122A  
 Dramatic Art 122B  
 Dramatic Art 122C  
 Dramatic Art 124D  
 Dramatic Art 124E  
 Dramatic Art 156D  
 Education 100  
 Education 142  
 Education 152  
 Education 183  
 Education 185  
 Engr: Aerospace Sci 130B  
 Engr: Biological Systems 1  
 Engr: Biological Systems 125  
 Engr: Biological Systems 170A  
 Engr: Biological Systems 170B  
 Engr: Biological Systems 170BL  
 Engr: Biological Systems 170C  
 Engr: Biological Systems 170CL  
 Engr: Biomedical 110A  
 Engr: Biomedical 110B  
 Engr: Biomedical 116  
 Engr: Biomedical 151  
 Engr: Biomedical 152  
 Engr: Biomedical 173  
 Engr: Chemical 155  
 Engr: Chemical 155A  
 Engr: Chemical 158C  
 Engr: Civil & Environ 3  
 Engr: Civil & Environ 137  
 Engr: Materials Science 180  
 Engr: Materials Science 181  
 Engr: Materials Science 188A  
 Engr: Materials Science 188B  
 Engr: Mechanical 185A  
 Engr: Mechanical 185B  
 English 120  
 Entomology 1  
 Entomology 105  
 Entomology 119  
 Environmental Toxicology 104  
 Environmental Toxicology 110  
 Environmental Toxicology 120  
 Environmental Toxicology 127  
 Environmental Toxicology 130  
 Evolution and Ecology 11  
 Evolution and Ecology 141  
 Evolution and Ecology 181  
 Fiber And Polymer Science 150  
 Fiber And Polymer Science 161  
 Fiber And Polymer Science 161L  
 Film Studies 1  
 Film Studies 45  
 Film Studies 120  
 Film Studies 121  
 Film Studies 121S  
 Film Studies 124  
 Film Studies 125  
 Film Studies 127  
 Film Studies 142  
 Film Studies 176A  
 Film Studies 176B  
 Film Studies 189  
 Food Science & Technology 159  
 Food Science & Technology 160  
 Food Science & Technology 190  
 French 21  
 French 21S  
 French 22  
 French 22S  
 French 23  
 French 23S  
 French 53  
 French 118A  
 Geology 115  
 Geology 183  
 German 3  
 German 20  
 German 21  
 German 22  
 German 40  
 German 45  
 German 101A  
 German 103  
 German 104  
 German 105  
 German 112  
 German 114  
 German 116  
 German 117  
 German 119  
 German 120  
 German 122  
 German 133  
 German 142  
 German 143  
 German 168  
 German 176A  
 Global Disease Biology 102  
 History 12  
 Hydrologic Science 142  
 International Relations 194HA  
 International Relations 194HB  
 Italian 101  
 Italian 101S  
 Italian 105  
 Italian 107  
 Italian 107S  
 Italian 108  
 Italian 108S  
 Italian 112  
 Italian 113  
 Italian 114  
 Italian 115A  
 Italian 115B  
 Italian 115C  
 Italian 116  
 Italian 118  
 Italian 119  
 Italian 121  
 Italian 121S  
 Italian 128  
 Italian 131  
 Italian 139B  
 Italian 140  
 Italian 145  
 Italian 145S  
 Japanese 1  
 Japanese 1A  
 Japanese 1AS  
 Japanese 2  
 Japanese 3  
 Japanese 4  
 Japanese 5  
 Japanese 6  
 Japanese 7S  
 Japanese 111  
 Japanese 112  
 Japanese 113  
 Japanese 114A  
 Japanese 114B  
 Japanese 114C  
 Japanese 117S  
 Japanese 121  
 Japanese 122  
 Japanese 123  
 Jewish Studies 116  
 Landscape Architecture 21  
 Landscape Architecture 60  
 Landscape Architecture 70  
 Landscape Architecture 102  
 Landscape Architecture 142  
 Landscape Architecture 160  
 Landscape Architecture 170  
 Landscape Architecture 171  
 Landscape Architecture 180  
 Landscape Architecture 181F  
 Landscape Architecture 181J  
 Landscape Architecture 181K  
 Linguistics 5  
 Linguistics 15  
 Mathematics 189  
 Med - Public Health Sciences 175W  
 Middle East/S. Asian Std 122A  
 Middle East/S. Asian Std 131A  
 Middle East/S. Asian Std 131C  
 Middle East/S. Asian Std 151A  
 Molecular and Cellular Biology 138  
 Molecular and Cellular Biology 139  
 Molecular and Cellular Biology 140L  
 Molecular and Cellular Biology 148  
 Molecular and Cellular Biology 158  
 Molecular and Cellular Biology 178  
 Molecular and Cellular Biology 194  
 Molecular and Cellular Biology 194H  
 Music 121  
 Music 122  
 Native American Studies 5  
 Native American Studies 33  
 Native American Studies 34  
 Native American Studies 101  
 Native American Studies 115  
 Native American Studies 122  
 Native American Studies 123  
 Native American Studies 133B  
 Native American Studies 135  
 Native American Studies 157  
 Native American Studies 180  
 Native American Studies 181A  
 Native American Studies 181B  
 Native American Studies 181C  
 Native American Studies 184  
 Native American Studies 185  
 Native American Studies 188  
 Native American Studies 191  
 Neuro, Physio & Behavior 106  
 Nutrition 11  
 Nutrition 104  
 Nutrition 115  
 Nutrition 127  
 Nutrition 129  
 Nutrition 190  
 Plant Science 141  
 Plant Science 150  
 Plant Science 188  
 Plant Science 193  
 Political Science 193W  
 Political Science 194HA  
 Political Science 194HB  
 Religious Studies 1  
 Religious Studies 1B  
 Religious Studies 1C  
 Religious Studies 1E  
 Religious Studies 1G  
 Religious Studies 1H  
 Religious Studies 11  
 Religious Studies 12  
 Religious Studies 15Y  
 Religious Studies 105  
 Religious Studies 111  
 Religious Studies 115  
 Religious Studies 120  
 Religious Studies 143  
 Religious Studies 161B  
 Religious Studies 163  
 Religious Studies 166  
 Russian 3  
 Russian 4  
 Russian 5  
 Russian 6  
 Russian 105  
 Russian 122  
 Russian 124  
 Russian 130  
 Russian 133  
 Russian 139  
 Russian 141  
 Russian 143  
 Russian 150  
 Science & Tech Studies 40A  
 Science & Tech Studies 40B  
 Science & Tech Studies 120  
 Science & Tech Studies 151  
 Science & Tech Studies 162  
 Science and Society 20

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

<sup>†</sup> Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Science and Society 25  
 Science and Society 25V  
 Science and Society 41  
 Science and Society 42  
 Science and Society 130  
 Soil Science 109  
 Spanish 8  
 Spanish 21V  
 Spanish 22V  
 Spanish 28  
 Spanish 31  
 Spanish 32  
 Spanish 33  
 Spanish 100  
 Spanish 100S  
 Spanish 117  
 Spanish 132  
 Spanish 133N  
 Spanish 138N  
 Spanish 142  
 Spanish 178A  
 Spanish 180  
 Spanish 181  
 Spanish 182  
 Textiles & Clothing 164  
 VM Molecular Biosciences 101Y  
 VM Pathology, Microbiol & Immun 129Y  
 Viticulture & Enology 111  
 Viticulture & Enology 124L  
 Washington Center 175  
 Washington Center 193  
 Women's Studies 145  
 Women's Studies 182

### Quantitative (QL)

Agricult & Res Econ 100A  
 Agricult & Res Econ 100B  
 Agricult & Res Econ 106  
 Agricult & Res Econ 155  
 Agricult & Res Econ 156  
 Agricult & Res Econ 171A  
 Agricult & Res Econ 171B  
 Agricult & Res Econ 194HA  
 Agricult & Res Econ 194HB  
 Animal Science 15  
 Animal Science 18  
 Animal Science 41L  
 Animal Science 42  
 Animal Science 106  
 Animal Science 112  
 Animal Science 115  
 Animal Science 123  
 Animal Science 128  
 Animal Science 136  
 Animal Science 137  
 Animal Science 142  
 Animal Science 144  
 Animal Science 146  
 Animal Science 148  
 Anthropology 105  
 Anthropology 153  
 Anthropology 154B  
 Anthropology 157  
 Anthropology 157L  
 Anthropology 159  
 Anthropology 182  
 Anthropology 183  
 Applied Biological System Tech 15  
 Applied Biological System Tech 16  
 Applied Biological System Tech 17  
 Applied Biological System Tech 49  
 Applied Biological System Tech 52  
 Applied Biological System Tech 101  
 Applied Biological System Tech 110L  
 Applied Biological System Tech 142  
 Applied Biological System Tech 161  
 Applied Biological System Tech 163  
 Applied Biological System Tech 165  
 Applied Biological System Tech 182  
 Atmospheric Science 5  
 Atmospheric Science 10  
 Atmospheric Science 60  
 Atmospheric Science 110  
 Atmospheric Science 111  
 Atmospheric Science 111LY  
 Atmospheric Science 116  
 Atmospheric Science 120  
 Atmospheric Science 121A  
 Atmospheric Science 121B  
 Atmospheric Science 124  
 Atmospheric Science 128  
 Atmospheric Science 133  
 Atmospheric Science 149  
 Atmospheric Science 158

Atmospheric Science 160  
 Avian Sciences 150  
 Biological Sciences 2B  
 Biological Sciences 2C  
 Biological Sciences 101  
 Biological Sciences 102  
 Biological Sciences 102Q  
 Biological Sciences 105  
 Biological Sciences 122  
 Biological Sciences 124  
 Biological Sciences 132  
 Biological Sciences 133  
 Biological Sciences 134  
 Biological Sciences 180L  
 Biological Sciences 181  
 Biological Sciences 183  
 Chemistry 2A  
 Chemistry 2AH  
 Chemistry 2B  
 Chemistry 2BH  
 Chemistry 2C  
 Chemistry 2CH  
 Chemistry 3A  
 Chemistry 105  
 Chemistry 110A  
 Chemistry 115  
 Chemistry 125  
 Chicano Studies 40  
 Chicano Studies 40S  
 Chicano Studies 140A  
 Communication 12Y  
 Communication 102  
 Comm & Reg Devlpmnt 156  
 Economics 1A  
 Economics 1B  
 Education 114  
 Education 119  
 Education 121  
 Engineering 6  
 Engineering 20  
 Engineering 45  
 Engineering 45Y  
 Engineering 102  
 Engineering 104  
 Engineering 105  
 Engineering 106  
 Engineering 111  
 Engineering 121  
 Engineering 122  
 Engr: Aerospace Sci 127  
 Engr: Aerospace Sci 129  
 Engr: Aerospace Sci 130A  
 Engr: Aerospace Sci 130B  
 Engr: Aerospace Sci 135  
 Engr: Aerospace Sci 138  
 Engr: Biological Systems 1  
 Engr: Biological Systems 75  
 Engr: Biological Systems 103  
 Engr: Biological Systems 114  
 Engr: Biological Systems 115  
 Engr: Biological Systems 120  
 Engr: Biological Systems 125  
 Engr: Biological Systems 127  
 Engr: Biological Systems 128  
 Engr: Biological Systems 130  
 Engr: Biological Systems 135  
 Engr: Biological Systems 144  
 Engr: Biological Systems 145  
 Engr: Biological Systems 147  
 Engr: Biological Systems 161  
 Engr: Biological Systems 165  
 Engr: Biological Systems 170A  
 Engr: Biological Systems 170B  
 Engr: Biological Systems 170BL  
 Engr: Biological Systems 170C  
 Engr: Biological Systems 170CL  
 Engr: Biological Systems 175  
 Engr: Biomedical 20  
 Engr: Biomedical 102  
 Engr: Biomedical 105  
 Engr: Biomedical 106  
 Engr: Biomedical 107  
 Engr: Biomedical 108  
 Engr: Biomedical 117  
 Engr: Biomedical 126  
 Engr: Biomedical 140  
 Engr: Biomedical 141  
 Engr: Biomedical 151  
 Engr: Biomedical 161A  
 Engr: Biomedical 161L  
 Engr: Biomedical 161S  
 Engr: Biomedical 162  
 Engr: Biomedical 163  
 Engr: Biomedical 167  
 Engr: Chemical 141  
 Engr: Chemical 142  
 Engr: Chemical 155A  
 Engr: Chemical 155B  
 Engr: Chemical 157  
 Engr: Chemical 158B  
 Engr: Chemical 158C  
 Engr: Chemical 160  
 Engr: Chemical 161A  
 Engr: Chemical 161B  
 Engr: Chemical 161C  
 Engr: Chemical 161L  
 Engr: Chemical-Materials 5  
 Engr: Chemical-Materials 6  
 Engr: Chemical-Materials 194HC  
 Engr: Civil & Environ 16  
 Engr: Civil & Environ 114  
 Engr: Civil & Environ 130  
 Engr: Civil & Environ 135  
 Engr: Civil & Environ 137  
 Engr: Civil & Environ 139  
 Engr: Civil & Environ 142  
 Engr: Civil & Environ 143  
 Engr: Civil & Environ 148B  
 Engr: Civil & Environ 149  
 Engr: Civil & Environ 153  
 Engr: Civil & Environ 155  
 Engr: Civil & Environ 161  
 Engr: Civil & Environ 165  
 Engr: Civil & Environ 179  
 Engr: Computer Science 10  
 Engr: Computer Science 15  
 Engr: Computer Science 20  
 Engr: Computer Science 30  
 Engr: Computer Science 60  
 Engr: Computer Science 120  
 Engr: Computer Science 122B  
 Engr: Computer Science 127  
 Engr: Computer Science 132  
 Engr: Elect & Compu 100  
 Engr: Elect & Compu 150A  
 Engr: Elect & Compu 150B  
 Engr: Materials Science 147  
 Engr: Materials Science 160  
 Engr: Materials Science 162  
 Engr: Materials Science 162L  
 Engr: Materials Science 164  
 Engr: Materials Science 172  
 Engr: Materials Science 172L  
 Engr: Materials Science 174  
 Engr: Materials Science 174L  
 Engr: Materials Science 182  
 Engr: Mechanical 5  
 Engr: Mechanical 50  
 Engr: Mechanical 108  
 Engr: Mechanical 109  
 Engr: Mechanical 121  
 Engr: Mechanical 134  
 Engr: Mechanical 150A  
 Engr: Mechanical 150B  
 Engr: Mechanical 151  
 Engr: Mechanical 152  
 Engr: Mechanical 154  
 Engr: Mechanical 161  
 Engr: Mechanical 163  
 Engr: Mechanical 165  
 Engr: Mechanical 171  
 Engr: Mechanical 172  
 Engr: Mechanical 185A  
 Engr: Mechanical 185B  
 Entomology 180A  
 Entomology 180B  
 Environmental Horticulture 120  
 Environmental Sci & Management 47  
 Environmental Sci & Management 100  
 Environmental Sci & Management 121  
 Environmental Sci & Management 131  
 Environmental Sci & Management 186  
 Environ Science & Policy 105  
 Environ Science & Policy 110  
 Environ Science & Policy 121  
 Environ Science & Policy 150A  
 Environ Science & Policy 178  
 Environmental Toxicology 102A  
 Environmental Toxicology 127  
 Environmental Toxicology 135  
 Environmental Toxicology 146  
 Evolution and Ecology 10  
 Evolution and Ecology 100  
 Evolution and Ecology 101  
 Evolution and Ecology 103  
 Evolution and Ecology 106  
 Evolution and Ecology 107  
 Evolution and Ecology 110  
 Evolution and Ecology 114  
 Evolution and Ecology 141  
 Evolution and Ecology 147  
 Evolution and Ecology 180A  
 Evolution and Ecology 180B  
 Evolution and Ecology 181  
 Exercise Biology 103  
 Exercise Biology 111  
 Exercise Biology 115  
 Exercise Biology 126  
 Exercise Biology 148L  
 Fiber And Polymer Science 100  
 Fiber And Polymer Science 150  
 Fiber And Polymer Science 161  
 Fiber And Polymer Science 161L  
 Fiber And Polymer Science 180A  
 Fiber And Polymer Science 180B  
 Food Science & Technology 50  
 Food Science & Technology 100B  
 Food Science & Technology 101A  
 Food Science & Technology 101B  
 Food Science & Technology 102B  
 Food Science & Technology 103  
 Food Science & Technology 104  
 Food Science & Technology 104L  
 Food Science & Technology 107  
 Food Science & Technology 109  
 Food Science & Technology 110  
 Food Science & Technology 110L  
 Food Science & Technology 117  
 Food Science & Technology 119  
 Food Science & Technology 123  
 Food Science & Technology 123L  
 Food Science & Technology 127  
 Food Science & Technology 151Y  
 Geology 30  
 Geology 146  
 Geology 147  
 Geology 148  
 Geology 150A  
 Geology 160  
 Geology 161  
 Geology 162  
 Geology 163  
 Global Disease Biology 101  
 Hydrologic Science 47  
 Hydrologic Science 103N  
 Hydrologic Science 124  
 Hydrologic Science 134  
 Hydrologic Science 141  
 Hydrologic Science 142  
 Hydrologic Science 143  
 Hydrologic Science 144  
 Hydrologic Science 147  
 Hydrologic Science 151  
 Hydrologic Science 182  
 International Agricultural Dev 142  
 Linguistics 127  
 Management 12Y  
 Mathematics 12  
 Mathematics 16A  
 Mathematics 16B  
 Mathematics 16C  
 Mathematics 17A  
 Mathematics 17B  
 Mathematics 21A  
 Mathematics 21AH  
 Mathematics 21B  
 Mathematics 21C  
 Mathematics 21D  
 Mathematics 22A  
 Mathematics 22AL  
 Mathematics 22B  
 Mathematics 115A  
 Mathematics 115B  
 Mathematics 118A  
 Mathematics 118B  
 Mathematics 118C  
 Mathematics 119A  
 Mathematics 119B  
 Mathematics 124  
 Mathematics 128A  
 Mathematics 128B  
 Mathematics 128C  
 Mathematics 129  
 Mathematics 133  
 Mathematics 135A  
 Mathematics 135B  
 Mathematics 145  
 Mathematics 148  
 Mathematics 160  
 Mathematics 165  
 Mathematics 167  
 Mathematics 168  
 Mathematics 189  
 Med - Psychiatry 12U  
 Microbiology 102

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

<sup>†</sup> Also assigned to another area of topical breadth.

<sup>#</sup> Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Molecular and Cellular Biology 10  
 Molecular and Cellular Biology 120L  
 Molecular and Cellular Biology 121  
 Molecular and Cellular Biology 123  
 Molecular and Cellular Biology 140L  
 Molecular and Cellular Biology 143  
 Molecular and Cellular Biology 160L  
 Molecular and Cellular Biology 162  
 Neuro, Physio & Behavior 14  
 Neuro, Physio & Behavior 100  
 Neuro, Physio & Behavior 10Q  
 Neuro, Physio & Behavior 106  
 Neuro, Physio & Behavior 111C  
 Neuro, Physio & Behavior 121  
 Neuro, Physio & Behavior 139  
 Neuro, Physio & Behavior 141  
 Neuro, Physio & Behavior 159  
 Neuro, Physio & Behavior 166  
 Neuro, Physio & Behavior 167  
 Neuro, Physio & Behavior 169  
 Nutrition 112  
 Nutrition 113  
 Nutrition 115  
 Nutrition 122  
 Nutrition 124  
 Nutrition 127  
 Physics 30  
 Plant Biology 112  
 Plant Biology 113  
 Plant Science 120  
 Political Science 12Y  
 Political Science 51  
 Political Science 102  
 Political Science 107  
 Political Science 108  
 Political Science 109  
 Political Science 110  
 Political Science 114  
 Political Science 121  
 Political Science 140A  
 Political Science 140D  
 Political Science 140E  
 Political Science 160  
 Political Science 175  
 Political Science 196E  
 Psychology 12Y  
 Psychology 41  
 Psychology 103A  
 Psychology 103B  
 Psychology 104  
 Psychology 107  
 Psychology 120  
 Science and Society 18  
 Science and Society 25  
 Science and Society 25V  
 Sociology 12Y  
 Sociology 46B  
 Sociology 106  
 Sociology 170  
 Soil Science 10  
 Soil Science 100  
 Soil Science 102  
 Soil Science 105  
 Soil Science 109  
 Soil Science 111  
 Soil Science 120  
 Statistics 10  
 Statistics 12  
 Statistics 13  
 Statistics 13Y  
 Statistics 32  
 Statistics 100  
 Statistics 101  
 Statistics 103  
 Statistics 104  
 Statistics 108  
 Statistics 130A  
 Statistics 130B  
 Statistics 131A  
 Statistics 135  
 Statistics 137  
 Statistics 138  
 Statistics 141  
 Statistics 144  
 Statistics 145  
 Statistics 200A  
 Textiles & Clothing 162L  
 Textiles & Clothing 163L  
 Viticulture & Enology 123L  
 Viticulture & Enology 125  
 Viticulture & Enology 125L  
 Viticulture & Enology 140

**Scientific (SL)**

Animal Genetics 105  
 Animal Genetics 111  
 Animal Science 2  
 Animal Science 18  
 Animal Science 41L  
 Animal Science 42  
 Animal Science 103  
 Animal Science 106  
 Animal Science 115  
 Animal Science 124  
 Animal Science 128  
 Animal Science 129  
 Animal Science 136  
 Animal Science 137  
 Animal Science 142  
 Animal Science 143  
 Animal Science 144  
 Animal Science 146  
 Animal Science 170  
 Anthropology 1  
 Anthropology 1Y  
 Anthropology 3  
 Anthropology 15  
 Anthropology 50  
 Anthropology 54  
 Applied Biological System Tech 161  
 Applied Biological System Tech 163  
 Applied Biological System Tech 181N  
 Applied Biological System Tech 182  
 Astronomy 10G  
 Astronomy 10S  
 Astronomy 25  
 Atmospheric Science 5  
 Atmospheric Science 6  
 Atmospheric Science 10  
 Atmospheric Science 115  
 Atmospheric Science 124  
 Atmospheric Science 133  
 Atmospheric Science 149  
 Atmospheric Science 160  
 Avian Sciences 13  
 Avian Sciences 121  
 Avian Sciences 123  
 Biological Sciences 2B  
 Biological Sciences 2C  
 Biological Sciences 10  
 Biological Sciences 101  
 Biological Sciences 122  
 Biological Sciences 132  
 Biological Sciences 133  
 Biological Sciences 181  
 Biotechnology 161B  
 Biotechnology 171  
 Chemistry 2A  
 Chemistry 2AH  
 Chemistry 2B  
 Chemistry 2BH  
 Chemistry 2C  
 Chemistry 3A  
 Chemistry 10  
 Chemistry 105  
 Chemistry 118A  
 Chemistry 118B  
 Chemistry 118C  
 Engineering 20  
 Engineering 45  
 Engineering 45Y  
 Engineering 106  
 Engineering 160  
 Engr: Aerospace Sci 127  
 Engr: Biological Systems 1  
 Engr: Biological Systems 75  
 Engr: Biological Systems 115  
 Engr: Biological Systems 120  
 Engr: Biological Systems 128  
 Engr: Biological Systems 130  
 Engr: Biological Systems 135  
 Engr: Biological Systems 144  
 Engr: Biological Systems 145  
 Engr: Biological Systems 147  
 Engr: Biological Systems 165  
 Engr: Biological Systems 170A  
 Engr: Biological Systems 170B  
 Engr: Biological Systems 170BL  
 Engr: Biological Systems 170C  
 Engr: Biological Systems 170CL  
 Engr: Biomedical 106  
 Engr: Biomedical 109  
 Engr: Biomedical 110A  
 Engr: Biomedical 110B  
 Engr: Biomedical 116  
 Engr: Biomedical 117  
 Engr: Biomedical 126  
 Engr: Biomedical 140  
 Engr: Biomedical 161L  
 Engr: Biomedical 162  
 Engr: Biomedical 173  
 Engr: Chemical 158A  
 Engr: Chemical 158C  
 Engr: Chemical 161C  
 Engr: Chemical-Materials 1  
 Engr: Civil & Environ 123  
 Engr: Civil & Environ 143  
 Engr: Civil & Environ 149  
 Engr: Civil & Environ 153  
 Engr: Civil & Environ 155  
 Engr: Civil & Environ 162  
 Engr: Civil & Environ 163  
 Engr: Civil & Environ 179  
 Engr: Computer Science 10  
 Engr: Computer Science 127  
 Engr: Computer Science 188  
 Engr: Elect & Comput 140A  
 Engr: Materials Science 160  
 Engr: Materials Science 162L  
 Engr: Materials Science 164  
 Engr: Materials Science 172  
 Engr: Materials Science 172L  
 Engr: Materials Science 174  
 Engr: Materials Science 174L  
 Engr: Materials Science 180  
 Engr: Materials Science 188A  
 Engr: Materials Science 188B  
 Engr: Mechanical 121  
 English 164  
 Entomology 2  
 Entomology 10  
 Entomology 105  
 Entomology 116  
 Entomology 117  
 Entomology 123  
 Entomology 153  
 Environmental Horticulture 1  
 Environmental Horticulture 150  
 Environmental Horticulture 160  
 Environmental Horticulture 160L  
 Environmental Sci & Management 8  
 Environmental Sci & Management 30  
 Environmental Sci & Management 47  
 Environmental Sci & Management 100  
 Environmental Sci & Management 108  
 Environmental Sci & Management 121  
 Environmental Sci & Management 131  
 Environmental Sci & Management 141  
 Environ Science & Policy 1  
 Environ Science & Policy 10  
 Environ Science & Policy 30  
 Environ Science & Policy 100  
 Environ Science & Policy 110  
 Environ Science & Policy 111  
 Environ Science & Policy 116N  
 Environ Science & Policy 121  
 Environ Science & Policy 123  
 Environ Science & Policy 124  
 Environ Science & Policy 127  
 Environ Science & Policy 150C  
 Environ Science & Policy 152  
 Environ Science & Policy 155L  
 Environ Science & Policy 163  
 Environmental Toxicology 10  
 Environmental Toxicology 20  
 Environmental Toxicology 101  
 Environmental Toxicology 102A  
 Environmental Toxicology 104  
 Environmental Toxicology 110  
 Environmental Toxicology 120  
 Environmental Toxicology 127  
 Environmental Toxicology 130  
 Environmental Toxicology 135  
 Environmental Toxicology 146  
 Evolution and Ecology 2  
 Evolution and Ecology 10  
 Evolution and Ecology 11  
 Evolution and Ecology 12  
 Evolution and Ecology 13  
 Evolution and Ecology 100  
 Evolution and Ecology 101  
 Evolution and Ecology 103  
 Evolution and Ecology 104  
 Evolution and Ecology 111  
 Evolution and Ecology 115  
 Evolution and Ecology 138  
 Evolution and Ecology 141  
 Evolution and Ecology 147  
 Evolution and Ecology 149  
 Evolution and Ecology 181  
 Exercise Biology 10  
 Exercise Biology 101  
 Exercise Biology 112  
 Exercise Biology 126  
 Fiber And Polymer Science 110  
 Fiber And Polymer Science 150  
 Fiber And Polymer Science 161  
 Fiber And Polymer Science 161L  
 Food Science & Technology 3  
 Food Science & Technology 10  
 Food Science & Technology 109  
 Food Science & Technology 110L  
 Geology 1  
 Geology 2  
 Geology 4  
 Geology 10  
 Geology 16  
 Geology 17  
 Geology 18  
 Geology 18V  
 Geology 20  
 Geology 25  
 Geology 28  
 Geology 35  
 Geology 50  
 Geology 91  
 Geology 108  
 Geology 116N  
 Geology 130  
 Geology 131  
 Geology 150C  
 Global Disease Biology 102  
 Global Disease Biology 103  
 History 109B  
 Human Development 117  
 Hydrologic Science 10  
 Hydrologic Science 47  
 Hydrologic Science 110  
 Hydrologic Science 124  
 Hydrologic Science 141  
 Hydrologic Science 143  
 Hydrologic Science 144  
 Hydrologic Science 147  
 Hydrologic Science 151  
 Hydrologic Science 182  
 Integrated Studies 8A  
 Landscape Architecture 180I  
 Mathematics 12  
 Mathematics 16A  
 Mathematics 16B  
 Mathematics 16C  
 Mathematics 17A  
 Mathematics 17B  
 Mathematics 17C  
 Mathematics 21A  
 Mathematics 21B  
 Mathematics 115B  
 Mathematics 133  
 Microbiology 101  
 Microbiology 102  
 Microbiology 175  
 Molecular and Cellular Biology 10  
 Molecular and Cellular Biology 110Y  
 Molecular and Cellular Biology 121  
 Molecular and Cellular Biology 126  
 Molecular and Cellular Biology 140L  
 Molecular and Cellular Biology 150  
 Molecular and Cellular Biology 162  
 Molecular and Cellular Biology 164  
 Nematology 10V  
 Neuro, Physio & Behavior 12  
 Neuro, Physio & Behavior 14  
 Neuro, Physio & Behavior 15V  
 Neuro, Physio & Behavior 17  
 Neuro, Physio & Behavior 102  
 Neuro, Physio & Behavior 107  
 Neuro, Physio & Behavior 112  
 Neuro, Physio & Behavior 121  
 Neuro, Physio & Behavior 124  
 Neuro, Physio & Behavior 127  
 Neuro, Physio & Behavior 165  
 Neuro, Physio & Behavior 168  
 Nutrition 10  
 Nutrition 104  
 Nutrition 115  
 Nutrition 118  
 Nutrition 124  
 Nutrition 127  
 Nutrition 129  
 Philosophy 10  
 Philosophy 13  
 Philosophy 13G  
 Philosophy 30  
 Philosophy 31  
 Philosophy 38

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Philosophy 108	Applied Biological System Tech 161	Art Studio 125C	Comm & Reg Devlpmnt 20
Physics 10C	Applied Biological System Tech 163	Art Studio 125D	Comm & Reg Devlpmnt 147
Physics 160	Applied Biological System Tech 165	Art Studio 129	Comm & Reg Devlpmnt 149
Plant Biology 10	Applied Biological System Tech 181N	Art Studio 138	Comm & Reg Devlpmnt 151
Plant Biology 112	Applied Biological System Tech 182	Art Studio 142A	Comm & Reg Devlpmnt 153A
Plant Biology 113	Art History 1A	Art Studio 142B	Comm & Reg Devlpmnt 154
Plant Biology 123	Art History 1B	Art Studio 142C	Comm & Reg Devlpmnt 164
Plant Biology 126	Art History 1C	Art Studio 147	Comparative Literature 4
Plant Biology 143	Art History 1D	Art Studio 148	Comparative Literature 11
Plant Pathology 123	Art History 1DY	Art Studio 149	Comparative Literature 100
Plant Pathology 140	Art History 1E	Art Studio 151	Comparative Literature 110
Plant Science 2	Art History 5	Art Studio 152A	Comparative Literature 152S
Plant Science 14	Art History 25	Art Studio 152B	Design 1
Plant Science 101	Art History 100	Art Studio 152C	Design 14
Plant Science 150	Art History 110	Art Studio 152D	Design 15
Plant Science 162	Art History 120A	Art Studio 152E	Design 16
Psychology 124	Art History 130	Art Studio 152F	Design 21
Science & Tech Studies 164	Art History 148	Art Studio 152G	Design 31
Science and Society 2	Art History 150	Art Studio 171	Design 37
Science and Society 4	Art History 151	Art Studio 190	Design 40A
Science and Society 8	Art History 152	Asian American Studies 1	Design 50
Science and Society 10	Art History 154	Asian American Studies 2	Design 70
Science and Society 13	Art History 155	Asian American Studies 4	Design 77
Science and Society 18	Art History 156	Asian American Studies 112	Design 107
Science and Society 20	Art History 163A	Asian American Studies 141	Design 115
Science and Society 25	Art History 163B	Asian American Studies 150B	Design 116
Science and Society 25V	Art History 163C	Asian American Studies 150C	Design 117
Science and Society 40	Art History 163D	Astronomy 10G	Design 127A
Science and Society 70A	Art History 164	Astronomy 10L	Design 127B
Science and Society 110	Art History 168	Astronomy 10S	Design 131
Sociology 103	Art History 172A	Astronomy 25	Design 132A
Sociology 106	Art History 172B	Atmospheric Science 5	Design 132B
Soil Science 10	Art History 173	Atmospheric Science 6	Design 134A
Soil Science 100	Art History 175	Atmospheric Science 10	Design 134B
Soil Science 102	Art History 176A	Atmospheric Science 60	Design 135A
Soil Science 105	Art History 176B	Atmospheric Science 110	Design 135B
Soil Science 109	Art History 176C	Atmospheric Science 111	Design 136A
Soil Science 111	Art History 177	Atmospheric Science 111LY	Design 136B
Soil Science 118	Art History 178B	Atmospheric Science 120	Design 137A
Soil Science 120	Art History 178C	Atmospheric Science 124	Design 137B
Statistics 108	Art History 179B	Atmospheric Science 128	Design 138
Textiles & Clothing 6	Art History 182	Atmospheric Science 133	Design 143
Textiles & Clothing 163L	Art History 183A	Atmospheric Science 158	Design 145
University Writing Program 120	Art History 183B	Atmospheric Science 160	Design 149
University Writing Program 121	Art History 183C	Biological Sciences 2B	Design 150A
VM Molecular Biosciences 101Y	Art History 184	Biological Sciences 2C	Design 150B
VM Pathology, Microbiol & Immun 129Y	Art History 185	Biological Sciences 122	Design 151
Wildlife, Fish & Conserv Biol 10	Art History 186	Biological Sciences 122P	Design 154
Wild, Fish & Conserv Biol 11	Art History 187	Biological Sciences 124	Design 155A
Wild, Fish & Conserv Biol 50	Art History 188A	Biological Sciences 132	Design 157
Wild, Fish & Conserv Biol 51	Art History 188B	Biological Sciences 133	Design 159
<b>Visual (VL)</b>			
Afr Am & Afr Std 16	Art History 189	Biological Sciences 134	Design 160
Afr Am & Afr Std 50	Art History 190A	Biological Sciences 180L	Design 161
Afr Am & Afr Std 51	Art History 190B	Biological Sciences 183	Design 170
Afr Am & Afr Std 155A	Art History 190C	Biotechnology 150	Design 171
Afr Am & Afr Std 168	Art History 190D	Chicano Studies 60	Design 177
Afr Am & Afr Std 169	Art History 190E	Chicano Studies 65	Design 179
Afr Am & Afr Std 170	Art History 190F	Chicano Studies 70	Design 180A
Afr Am & Afr Std 171	Art History 190G	Chicano Studies 73	Design 180B
Afr Am & Afr Std 175A	Art History 190H	Chicano Studies 155	Design 185
Afr Am & Afr Std 181	Art History 190I	Chicano Studies 157	Design 186
Afr Am & Afr Std 185	Art History 190J	Chicano Studies 160	Design 187
American Studies 139	Art History 190K	Chicano Studies 165	Dramatic Art 1
Animal Genetics 111	Art History 190L	Chicano Studies 170	Dramatic Art 2
Animal Science 2	Art Studio 2	Chicano Studies 171	Dramatic Art 5
Animal Science 15	Art Studio 5	Chicano Studies 172	Dramatic Art 10
Animal Science 18	Art Studio 7	Chinese 101	Dramatic Art 14
Animal Science 41L	Art Studio 8	Chinese 103	Dramatic Art 20
Animal Science 106	Art Studio 9	Chinese 130	Dramatic Art 21A
Animal Science 123	Art Studio 10	Chinese 134	Dramatic Art 24
Animal Science 136	Art Studio 11	Cinema & Technocultural Stud 12	Dramatic Art 40A
Animal Science 137	Art Studio 12	Cinema & Technocultural Stud 20	Dramatic Art 40B
Animal Science 142	Art Studio 24	Cinema & Technocultural Stud 40A	Dramatic Art 42A
Animal Science 144	Art Studio 30	Cinema & Technocultural Stud 40B	Dramatic Art 42B
Animal Science 146	Art Studio 101	Cinema & Technocultural Stud 41A	Dramatic Art 43A
Animal Science 194HB	Art Studio 102A	Cinema & Technocultural Stud 41B	Dramatic Art 43B
Anthropology 13	Art Studio 102B	Cinema & Technocultural Stud 116	Dramatic Art 55
Anthropology 32	Art Studio 102C	Cinema & Technocultural Stud 124E	Dramatic Art 56A
Anthropology 109	Art Studio 103A	Cinema & Technocultural Stud 146A	Dramatic Art 56B
Anthropology 136	Art Studio 103B	Cinema & Technocultural Stud 147A	Dramatic Art 56C
Anthropology 154A	Art Studio 105A	Cinema & Technocultural Stud 148B	Dramatic Art 114
Anthropology 182	Art Studio 105B	Cinema & Technocultural Stud 41B	Dramatic Art 115
Anthropology 186A	Art Studio 110A	Cinema & Technocultural Stud 150	Dramatic Art 116
Applied Biological System Tech 15	Art Studio 110B	Cinema & Technocultural Stud 162	Dramatic Art 120
Applied Biological System Tech 16	Art Studio 110C	Cinema & Technocultural Stud 172	Dramatic Art 121A
Applied Biological System Tech 17	Art Studio 111B	Classics 10	Dramatic Art 121B
Applied Biological System Tech 49	Art Studio 113	Classics 10Y	Dramatic Art 121C
Applied Biological System Tech 52	Art Studio 114A	Classics 15	Dramatic Art 122A
Applied Biological System Tech 101	Art Studio 114B	Classics 20	Dramatic Art 122B
Applied Biological System Tech 110L	Art Studio 114C	Classics 172A	Dramatic Art 122C
Applied Biological System Tech 142	Art Studio 117	Classics 172B	Dramatic Art 124A
Applied Biological System Tech 150	Art Studio 121	Classics 173	Dramatic Art 124B
	Art Studio 125A	Classics 175	Dramatic Art 124C
	Art Studio 125B	Communication 12Y	Dramatic Art 124D
		Communication 76	Dramatic Art 124E
		Comm & Reg Devlpmnt 1	Dramatic Art 124E

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Dramatic Art 125	Engr: Materials Science 174L	Food Science & Technology 123	Music 24A
Dramatic Art 127A	Engr: Materials Science 180	Food Science & Technology 123L	Music 24B
Dramatic Art 127B	Engr: Materials Science 181	Food Science & Technology 160	Music 24C
Dramatic Art 130	Engr: Materials Science 182	French 50	Music 28
Dramatic Art 140A	Engr: Materials Science 188A	French 122	Music 106
Dramatic Art 141	Engr: Materials Science 188B	French 125	Music 108A
Dramatic Art 142	Engr: Mechanical 5	French 125S	Music 108B
Dramatic Art 143	Engr: Mechanical 50	Geology 10	Music 110A
Dramatic Art 144A	Engr: Mechanical 108	Geology 20	Music 110B
Dramatic Art 144B	Engr: Mechanical 109	Geology 25	Music 110C
Dramatic Art 144C	Engr: Mechanical 121	Geology 36	Music 110D
Dramatic Art 146A	Engr: Mechanical 150A	Geology 62	Music 110E
Dramatic Art 146B	Engr: Mechanical 150B	Geology 81	Music 110F
Dramatic Art 146C	Engr: Mechanical 151	Geology 101L	Music 110G
Dramatic Art 150	Engr: Mechanical 152	Geology 103	Music 115
Dramatic Art 155A	Engr: Mechanical 154	Geology 110	Music 116
Dramatic Art 159	Engr: Mechanical 161	Geology 142	Music 124A
Dramatic Art 170	Engr: Mechanical 163	German 10	Music 124B
Dramatic Art 180B	Engr: Mechanical 165	German 11	Music 129A
Economics 102	Engr: Mechanical 171	German 45	Music 129B
Education 81	Engr: Mechanical 172	German 48	Music 129C
Education 122	Engr: Mechanical 185A	German 101A	Music 129D
Education 185	Engr: Mechanical 185B	German 104	Native American Studies 12
Engineering 4	English 41	German 114	Native American Studies 33
Engineering 17	English 160	German 117	Native American Studies 34
Engineering 100	English 161A	German 119	Native American Studies 101
Engineering 102	English 161B	German 120	Native American Studies 133A
Engineering 105	English 162	German 122	Neuro, Physio & Behavior 100Q
Engineering 106	English 172	German 133	Neuro, Physio & Behavior 106
Engineering 111	Entomology 1	German 142	Neuro, Physio & Behavior 111C
Engineering 121	Entomology 100L	German 143	Neuro, Physio & Behavior 127
Engr: Aerospace Sci 130A	Entomology 119	German 168	Neuro, Physio & Behavior 130
Engr: Aerospace Sci 130B	Entomology 180A	German 176A	Neuro, Physio & Behavior 141
Engr: Biological Systems 1	Entomology 180B	History 4B	Neuro, Physio & Behavior 141P
Engr: Biological Systems 75	Environmental Horticulture 6	History 11	Neuro, Physio & Behavior 160
Engr: Biological Systems 103	Environmental Horticulture 101	History 12	Neuro, Physio & Behavior 168
Engr: Biological Systems 114	Environmental Horticulture 105	History 110A	Neuroscience (Graduate Group) 160
Engr: Biological Systems 115	Environmental Sci & Management 144	History 161	Nutrition 115
Engr: Biological Systems 120	Environmental Sci & Management 186	History 193A	Nutrition 127
Engr: Biological Systems 125	Environmental Toxicology 20	History 193B	Nutrition 190
Engr: Biological Systems 127	Environmental Toxicology 102A	History 193D	Physics 10C
Engr: Biological Systems 128	Environmental Toxicology 102B	Human Rights 120A	Physics 12
Engr: Biological Systems 130	Environmental Toxicology 103B	Human Rights 131	Physics 116A
Engr: Biological Systems 135	Environmental Toxicology 120	Human Rights 161	Plant Biology 102
Engr: Biological Systems 144	Environmental Toxicology 127	Hydrologic Science 103N	Plant Biology 113
Engr: Biological Systems 145	Environmental Toxicology 130	Hydrologic Science 141	Plant Biology 116
Engr: Biological Systems 161	Environmental Toxicology 131	Hydrologic Science 144	Plant Science 21
Engr: Biological Systems 165	Environmental Toxicology 135	Hydrologic Science 182	Plant Science 102
Engr: Biological Systems 170A	Environmental Toxicology 138	International Agricultural Dev 142	Plant Science 116
Engr: Biological Systems 170B	Environmental Toxicology 146	Italian 107	Plant Science 131
Engr: Biological Systems 170BL	Evolution and Ecology 13	Italian 107S	Plant Science 144
Engr: Biological Systems 170C	Evolution and Ecology 101	Italian 108	Plant Science 147
Engr: Biological Systems 170CL	Evolution and Ecology 104	Italian 108S	Plant Science 147L
Engr: Biological Systems 175	Evolution and Ecology 106	Italian 121	Plant Science 176
Engr: Biomedical 20	Evolution and Ecology 107	Italian 121S	Political Science 12Y
Engr: Biomedical 102	Evolution and Ecology 110	Italian 145	Political Science 51
Engr: Biomedical 105	Evolution and Ecology 114	Italian 145S	Political Science 114
Engr: Biomedical 106	Evolution and Ecology 115	Italian 150	Political Science 194A
Engr: Biomedical 107	Evolution and Ecology 141	Japanese 106	Political Science 194HB
Engr: Biomedical 109	Evolution and Ecology 147	Japanese 109	Political Science 196E
Engr: Biomedical 110A	Evolution and Ecology 180A	Japanese 152	Psychology 12Y
Engr: Biomedical 110B	Evolution and Ecology 180B	Japanese 156	Religious Studies 1
Engr: Biomedical 116	Exercise Biology 115	Japanese 158	Religious Studies 1B
Engr: Biomedical 117	Fiber And Polymer Science 150	Landscape Architecture 1	Religious Studies 1C
Engr: Biomedical 140	Fiber And Polymer Science 161	Landscape Architecture 2	Religious Studies 1E
Engr: Biomedical 141	Fiber And Polymer Science 161L	Landscape Architecture 3	Religious Studies 1G
Engr: Chemical 155	Fiber And Polymer Science 180A	Landscape Architecture 21	Religious Studies 11
Engr: Chemical 155A	Fiber And Polymer Science 180B	Landscape Architecture 30	Religious Studies 15Y
Engr: Chemical 155B	Film Studies 1	Landscape Architecture 50	Religious Studies 30
Engr: Chemical 158A	Film Studies 45	Landscape Architecture 60	Religious Studies 42
Engr: Chemical 158C	Film Studies 120	Landscape Architecture 70	Religious Studies 45
Engr: Chemical 160	Film Studies 121	Landscape Architecture 102	Religious Studies 67
Engr: Chemical 161A	Film Studies 121S	Landscape Architecture 140	Religious Studies 68
Engr: Chemical 161C	Film Studies 124	Landscape Architecture 141	Religious Studies 69
Engr: Chemical 161L	Film Studies 125	Landscape Architecture 142	Religious Studies 105
Engr: Chemical-Materials 1	Film Studies 127	Landscape Architecture 150	Religious Studies 115
Engr: Civil & Environ 132	Film Studies 129	Landscape Architecture 160	Religious Studies 120
Engr: Civil & Environ 137	Film Studies 142	Landscape Architecture 170	Religious Studies 131
Engr: Civil & Environ 148B	Film Studies 176A	Landscape Architecture 171	Religious Studies 154
Engr: Civil & Environ 179	Film Studies 176B	Landscape Architecture 180	Religious Studies 157
Engr: Computer Science 12	Film Studies 189	Landscape Architecture 181F	Religious Studies 166
Engr: Computer Science 40	Film Studies 195H	Landscape Architecture 181G	Religious Studies 170
Engr: Computer Science 163	Film Studies 196H	Landscape Architecture 181I	Russian 122
Engr: Computer Science 175	Food Science & Technology 1	Landscape Architecture 181J	Russian 124
Engr: Computer Science 177	Food Science & Technology 10	Landscape Architecture 181K	Russian 129
Engr: Computer Science 178	Food Science & Technology 100A	Mathematics 141	Russian 130
Engr: Elect & Compu 100	Food Science & Technology 100B	Med - Psychiatry 12U	Russian 150
Engr: Elect & Compu 110A	Food Science & Technology 101A	Middle East/S. Asian Std 131A	Science & Tech Studies 32
Engr: Elect & Compu 110B	Food Science & Technology 101B	Middle East/S. Asian Std 131C	Science & Tech Studies 40A
Engr: Materials Science 160	Food Science & Technology 104	Middle East/S. Asian Std 151A	Science & Tech Studies 40B
Engr: Materials Science 162L	Food Science & Technology 104L	Molecular and Cellular Biology 120L	Science & Tech Studies 109
Engr: Materials Science 164	Food Science & Technology 109	Molecular and Cellular Biology 140L	Science & Tech Studies 120
Engr: Materials Science 172	Food Science & Technology 110	Molecular and Cellular Biology 160L	Science & Tech Studies 151
Engr: Materials Science 172L	Food Science & Technology 110L	Music 10	Science & Tech Studies 160
Engr: Materials Science 174	Food Science & Technology 119	Music 11	Science & Tech Studies 162

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Science & Tech Studies 172	Afr Am & Afr Std 163	Art History 163B	Chinese 115
Science and Society 18	Afr Am & Afr Std 168	Art History 163C	Chinese 116
Science and Society 25	Afr Am & Afr Std 171	Art History 163D	Chinese 120
Science and Society 25V	Afr Am & Afr Std 176	Art History 164	Chinese 130
Science and Society 40	Afr Am & Afr Std 177	Art History 175	Chinese 132
Science and Society 41	Afr Am & Afr Std 178	Art History 176A	Chinese 133
Sociology 12Y	Afr Am & Afr Std 180	Art History 176B	Chinese 134
Sociology 25	Afr Am & Afr Std 182	Art History 176C	Chinese 150
Soil Science 100	Agricul & Res Econ 1S	Art History 177	Chinese 160
Soil Science 105	Agricul & Res Econ 15	Art History 182	Chinese 194H
Soil Science 109	Agricul & Res Econ 115A	Art History 183A	Cinema & Technocultural Stud 41A
Soil Science 120	Agricul & Res Econ 115B	Art History 183B	Cinema & Technocultural Stud 41B
Spanish 132	Agricul & Res Econ 120S	Art History 183C	Cinema & Technocultural Stud 146A
Spanish 141	Anthropology 2	Art History 185	Cinema & Technocultural Stud 147A
Spanish 141S	Anthropology 4	Asian American Studies 1	Cinema & Technocultural Stud 148B
Spanish 143	Anthropology 20	Asian American Studies 2	Classics 1
Spanish 148	Anthropology 23	Asian American Studies 112	Classics 2
Spanish 148S	Anthropology 24	Asian American Studies 113	Classics 3
Spanish 170	Anthropology 26	Asian American Studies 114	Classics 4
Spanish 170S	Anthropology 29	Asian American Studies 115	Classics 10
Spanish 172	Anthropology 30	Asian American Studies 141	Classics 10Y
Spanish 173	Anthropology 34	Asian American Studies 150	Classics 15
Spanish 175	Anthropology 101	Asian American Studies 150B	Classics 20
Technocultural Studies 1	Anthropology 103	Asian American Studies 150C	Classics 50
Technocultural Studies 5	Anthropology 104N	Asian American Studies 150D	Classics 51
Technocultural Studies 7A	Anthropology 105	Asian American Studies 150E	Classics 101A
Technocultural Studies 7B	Anthropology 110	Asian American Studies 189A	Classics 101B
Technocultural Studies 7C	Anthropology 117	Chicano Studies 215	Classics 101C
Technocultural Studies 7D	Anthropology 120	Chicano Studies 405	Classics 101D
Technocultural Studies 7E	Anthropology 121	Chicano Studies 50	Classics 120
Technocultural Studies 100	Anthropology 122A	Chicano Studies 65	Classics 125
Technocultural Studies 101	Anthropology 122B	Chicano Studies 70	Classics 140
Technocultural Studies 103	Anthropology 123AN	Chicano Studies 73	Classics 142
Technocultural Studies 104	Anthropology 124	Chicano Studies 100	Classics 150
Technocultural Studies 110	Anthropology 125A	Chicano Studies 113	Classics 171
Technocultural Studies 111	Anthropology 125B	Chicano Studies 114	Classics 174
Technocultural Studies 150	Anthropology 126A	Chicano Studies 114S	Classics 175
Technocultural Studies 151	Anthropology 126B	Chicano Studies 122S	Communication 5
Technocultural Studies 152	Anthropology 127	Chicano Studies 125S	Comm & Reg Devlpmnt 118
Technocultural Studies 154	Anthropology 128A	Chicano Studies 131S	Comm & Reg Devlpmnt 141
Technocultural Studies 155	Anthropology 128B	Chicano Studies 135S	Comm & Reg Devlpmnt 152
Technocultural Studies 159	Anthropology 129	Chicano Studies 145S	Comm & Reg Devlpmnt 153A
Technocultural Studies 160	Anthropology 130A	Chicano Studies 147S	Comm & Reg Devlpmnt 153B
Technocultural Studies 170A	Anthropology 130BN	Chicano Studies 150	Comm & Reg Devlpmnt 153C
Technocultural Studies 170B	Anthropology 132	Chicano Studies 154	Comm & Reg Devlpmnt 154
Technocultural Studies 170C	Anthropology 134	Chicano Studies 155	Comm & Reg Devlpmnt 176
Technocultural Studies 170D	Anthropology 136	Chicano Studies 156	Comm & Reg Devlpmnt 180
Technocultural Studies 170E	Anthropology 138	Chicano Studies 157	Comparative Literature 1
Technocultural Studies 190	Anthropology 139AN	Chicano Studies 160	Comparative Literature 2
Textiles & Clothing 6	Anthropology 139BN	Chicano Studies 165	Comparative Literature 3
Textiles & Clothing 7	Anthropology 140A	Chicano Studies 170	Comparative Literature 4
Textiles & Clothing 107	Anthropology 140B	Chicano Studies 172	Comparative Literature 5
Textiles & Clothing 162	Anthropology 142	Chicano Studies 184	Comparative Literature 6
Textiles & Clothing 162L	Anthropology 143A	Chicano Studies 184S	Comparative Literature 7
Textiles & Clothing 163	Anthropology 144	Chinese 1	Comparative Literature 8
Textiles & Clothing 164	Anthropology 145	Chinese 1A	Comparative Literature 9
Textiles & Clothing 171	Anthropology 146N	Chinese 1BL	Comparative Literature 11
Textiles & Clothing 173	Anthropology 148A	Chinese 1CN	Comparative Literature 12
University Writing Program 12	Anthropology 149A	Chinese 2	Comparative Literature 13
University Writing Program 112A	Anthropology 149B	Chinese 2BL	Comparative Literature 14
Viticulture & Enology 123L	Anthropology 172	Chinese 2CN	Comparative Literature 20
Viticulture & Enology 125L	Anthropology 174	Chinese 3	Comparative Literature 24
Viticulture & Enology 128L	Anthropology 175	Chinese 3BL	Comparative Literature 25
Wild, Fish & Conserv Biol 101	Anthropology 177	Chinese 3CN	Comparative Literature 53A
Wild, Fish & Conserv Biol 155	Anthropology 178	Chinese 4	Comparative Literature 53B
Wild, Fish & Conserv Biol 156	Arabic 1	Chinese 4A	Comparative Literature 53C
Wild, Fish & Conserv Biol 157	Arabic 1A	Chinese 5	Comparative Literature 100
Women's Studies 20	Arabic 2	Chinese 6	Comparative Literature 110
Women's Studies 25	Arabic 3	Chinese 7	Comparative Literature 120
Women's Studies 50	Arabic 21	Chinese 10	Comparative Literature 135
Women's Studies 138	Arabic 22	Chinese 11	Comparative Literature 138
Women's Studies 139	Arabic 23	Chinese 50	Comparative Literature 139
Women's Studies 160	Arabic 101A	Chinese 100A	Comparative Literature 141
Women's Studies 162	Arabic 121	Chinese 100B	Comparative Literature 144
Women's Studies 164	Arabic 122	Chinese 101	Comparative Literature 145
Women's Studies 165	Arabic 123	Chinese 102	Comparative Literature 146
<b>World Cultures (WC)</b>			
Afr Am & Afr Std 12	Arabic 140	Chinese 103	Comparative Literature 147
Afr Am & Afr Std 16	Arabic 141	Chinese 104	Comparative Literature 148
Afr Am & Afr Std 17	Art History 1A	Chinese 105	Comparative Literature 151
Afr Am & Afr Std 18	Art History 1B	Chinese 106	Comparative Literature 152
Afr Am & Afr Std 52	Art History 1C	Chinese 107	Comparative Literature 152S
Afr Am & Afr Std 107A	Art History 1D	Chinese 108	Comparative Literature 153
Afr Am & Afr Std 107C	Art History 1DY	Chinese 109A	Comparative Literature 154
Afr Am & Afr Std 107D	Art History 1E	Chinese 109C	Comparative Literature 155
Afr Am & Afr Std 110	Art History 5	Chinese 109D	Comparative Literature 156
Afr Am & Afr Std 111	Art History 25	Chinese 109E	Comparative Literature 157
Afr Am & Afr Std 111	Art History 110	Chinese 109G	Comparative Literature 158
Afr Am & Afr Std 111	Art History 120A	Chinese 109H	Comparative Literature 159
Afr Am & Afr Std 152	Art History 130	Chinese 109I	Comparative Literature 160A
Afr Am & Afr Std 153	Art History 150	Chinese 110	Comparative Literature 160B
Afr Am & Afr Std 153	Art History 152	Chinese 111	Comparative Literature 161A
Afr Am & Afr Std 155A	Art History 154	Chinese 111A	Comparative Literature 161B
Afr Am & Afr Std 156	Art History 155	Chinese 112	Comparative Literature 162
Afr Am & Afr Std 157	Art History 156	Chinese 113	Comparative Literature 163
Afr Am & Afr Std 162	Art History 163A	Chinese 114	Comparative Literature 164A

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Comparative Literature 164B	French 115	History 15	History 194E
Comparative Literature 164C	French 116	History 80	History 195B
Comparative Literature 164D	French 117A	History 110	History 196A
Comparative Literature 165	French 117B	History 110A	History 196B
Comparative Literature 165S	French 118A	History 111A	Human Development 103
Comparative Literature 166	French 118B	History 111B	Human Rights 1
Comparative Literature 166A	French 119A	History 111C	Human Rights 120A
Comparative Literature 166B	French 119B	History 112A	Human Rights 130
Comparative Literature 167	French 119C	History 112B	Human Rights 131
Comparative Literature 168A	French 120	History 112C	Human Rights 134
Comparative Literature 168B	French 121	History 113	Human Rights 136
Comparative Literature 170	French 122	History 115A	Human Rights 138
Comparative Literature 172	French 124	History 115B	Human Rights 161
Comparative Literature 175	French 125	History 115C	Humanities 2A
Comparative Literature 180	French 125S	History 115D	Humanities 7
Comparative Literature 180S	French 127	History 115E	Humanities 9
Critical Theory 101	French 128S	History 115F	Humanities 9D
Dramatic Art 5	French 130	History 116	Humanities 13
Dramatic Art 20	French 133	History 119	Humanities 144
Dramatic Art 55	French 140	History 120	International Agricultural Dev 10
Dramatic Art 56A	French 141	History 121A	International Relations 104
Dramatic Art 56B	French 141S	History 121B	Italian 1
Dramatic Art 56C	French 162	History 121C	Italian 1S
Dramatic Art 144A	French 194H	History 122	Italian 2
Dramatic Art 144B	French 195H	History 125	Italian 2S
Dramatic Art 144C	German 1	History 130A	Italian 3
Dramatic Art 154	German 2	History 130B	Italian 3S
Dramatic Art 155A	German 3	History 130C	Italian 4
Dramatic Art 156B	German 10	History 131A	Italian 4S
Dramatic Art 156D	German 11	History 131B	Italian 5
Dramatic Art 159	German 20	History 131C	Italian 5S
Economics 115A	German 21	History 132	Italian 8A
Economics 115B	German 22	History 133	Italian 8AS
Economics 116	German 40	History 135A	Italian 8B
Economics 162	German 45	History 135B	Italian 8BS
English 111	German 48	History 136	Italian 9
English 113A	German 101A	History 138A	Italian 9S
English 113B	German 103	History 138B	Italian 50
English 115	German 104	History 138C	Italian 101
English 117	German 105	History 139A	Italian 101S
English 122	German 112	History 139B	Italian 104
English 123	German 113	History 140	Italian 104S
English 125	German 114	History 141	Italian 105
English 130	German 115	History 142A	Italian 107
English 133	German 116	History 142B	Italian 107S
English 137	German 117	History 143	Italian 108
English 138	German 118A	History 144A	Italian 108S
English 139	German 118B	History 144B	Italian 112
English 150A	German 118C	History 145	Italian 113
English 150B	German 118E	History 146A	Italian 114
English 155A	German 119	History 146B	Italian 115A
English 155B	German 120	History 147A	Italian 115C
English 155C	German 122	History 147B	Italian 115D
English 163	German 123	History 147C	Italian 119
English 171A	German 124	History 148A	Italian 120A
English 171B	German 125	History 148B	Italian 120B
Environmental Sci & Management 30	German 126	History 148C	Italian 121
Environ Science & Policy 30	German 127	History 149	Italian 121S
Environ Science & Policy 101	German 129	History 151A	Italian 128
Environ Science & Policy 105	German 131	History 151B	Italian 131
Film Studies 1	German 132	History 151C	Italian 139B
Film Studies 45	German 133	History 151D	Italian 140
Film Studies 120	German 134	History 159	Italian 141
Film Studies 121	German 141	History 160	Italian 142
Film Studies 121S	German 142	History 161	Italian 145
Film Studies 127	German 143	History 162	Italian 145S
Film Studies 129	German 144	History 163A	Italian 150
Film Studies 142	German 160	History 163B	Italian 190X
Film Studies 176A	German 168	History 164	Italian 194H
Film Studies 176B	German 176A	History 165	Italian 195H
Food Science & Technology 10	German 185	History 166A	Japanese 1
French 1	Greek 105	History 166B	Japanese 1A
French 1A	Hebrew 1A	History 167	Japanese 1AS
French 1S	Hebrew 10	History 168	Japanese 2
French 2	Hindi/Urdu 1	History 169A	Japanese 3
French 2S	Hindi/Urdu 1A	History 190A	Japanese 4
French 3	Hindi/Urdu 2	History 190B	Japanese 5
French 3S	Hindi/Urdu 3	History 190C	Japanese 6
French 21	History 1	History 190D	Japanese 7S
French 21S	History 3	History 191A	Japanese 10
French 22	History 4A	History 191B	Japanese 15S
French 22S	History 4B	History 191C	Japanese 25
French 23	History 4C	History 191D	Japanese 31
French 23S	History 6	History 191E	Japanese 50
French 50	History 7A	History 191F	Japanese 101
French 51	History 7B	History 191G	Japanese 102
French 52	History 7C	History 191H	Japanese 103
French 53	History 8	History 191J	Japanese 104
French 100	History 9A	History 193A	Japanese 105
French 101	History 9B	History 193B	Japanese 106
French 102	History 10A	History 193D	Japanese 107
French 107A	History 10B	History 194A	Japanese 108
French 107B	History 10C	History 194B	Japanese 109
French 107S	History 11	History 194C	Japanese 111
French 108	History 12	History 194D	Japanese 112

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Japanese 113	Political Science 119	Russian 4	Spanish 154
Japanese 117S	Political Science 124	Russian 5	Spanish 155
Japanese 121	Political Science 126	Russian 6	Spanish 156
Japanese 122	Political Science 137	Russian 101A	Spanish 157
Japanese 123	Political Science 142A	Russian 101B	Spanish 158
Japanese 130	Political Science 142B	Russian 101C	Spanish 159
Japanese 133	Political Science 143A	Russian 102	Spanish 159S
Japanese 134	Political Science 143B	Russian 105	Spanish 159Y
Japanese 135	Political Science 144A	Russian 122	Spanish 160
Japanese 136	Political Science 144B	Russian 124	Spanish 170
Japanese 137	Political Science 146A	Russian 126	Spanish 170S
Japanese 138	Political Science 146B	Russian 129	Spanish 171
Japanese 151	Political Science 147A	Russian 130	Spanish 171S
Japanese 152	Political Science 147B	Russian 133	Spanish 172
Japanese 153	Political Science 147C	Russian 139	Spanish 173
Japanese 154	Political Science 147D	Russian 140	Spanish 175
Japanese 155	Political Science 148A	Russian 142	Spanish 182
Japanese 156	Political Science 148B	Russian 143	Spanish 194H
Japanese 157	Political Science 148C	Russian 150	Spanish 198
Japanese 158	Portuguese 1	Russian 192	Spanish 199
Japanese 194H	Portuguese 1A	Science & Tech Studies 50	Textiles & Clothing 7
Japanese 198	Portuguese 2	Science & Tech Studies 51	Textiles & Clothing 174
Japanese 199	Portuguese 3	Science & Tech Studies 120	Women's Studies 20
Jewish Studies 10	Portuguese 8	Science & Tech Studies 121	Women's Studies 25
Jewish Studies 101	Portuguese 21	Science & Tech Studies 129	Women's Studies 102
Jewish Studies 110	Portuguese 22	Science and Society 7V	Women's Studies 136
Jewish Studies 111	Portuguese 23	Science and Society 25	Women's Studies 138
Jewish Studies 112	Portuguese 100	Science and Society 25V	Women's Studies 145
Jewish Studies 116	Portuguese 130	Science and Society 41	Women's Studies 146
Landscape Architecture 1	Portuguese 132	Science and Society 121	Women's Studies 148
Landscape Architecture 2	Portuguese 134	Sociology 4	Women's Studies 160
Landscape Architecture 10	Portuguese 141	Sociology 5	Women's Studies 162
Latin 110	Portuguese 159	Sociology 104	Women's Studies 164
Latin 118	Portuguese 161	Sociology 138	Women's Studies 178A
Latin 119	Portuguese 163	Sociology 145A	Women's Studies 178B
Latin 120	Portuguese 198	Sociology 145B	Women's Studies 178C
Latin 130	Religious Studies 1A	Sociology 147	Women's Studies 178D
Linguistics 5	Religious Studies 1B	Sociology 153	Women's Studies 178E
Linguistics 150	Religious Studies 1C	Sociology 160	Women's Studies 178F
Linguistics 182	Religious Studies 1D	Sociology 183	Women's Studies 179
Medieval Studies 20A	Religious Studies 1F	Sociology 188	Women's Studies 182
Medieval Studies 20B	Religious Studies 1G	Spanish 1	Women's Studies 184
Medieval Studies 130A	Religious Studies 1H	Spanish 1A	Women's Studies 185
Medieval Studies 130B	Religious Studies 1J	Spanish 15	
Medieval Studies 131	Religious Studies 11	Spanish 2	
Middle East/S. Asian Std 100	Religious Studies 12	Spanish 25	
Middle East/S. Asian Std 111A	Religious Studies 15Y	Spanish 2V	
Middle East/S. Asian Std 121A	Religious Studies 21	Spanish 2Y	
Middle East/S. Asian Std 121C	Religious Studies 23	Spanish 3	
Middle East/S. Asian Std 122A	Religious Studies 30	Spanish 35	
Middle East/S. Asian Std 131A	Religious Studies 40	Spanish 3V	
Middle East/S. Asian Std 131C	Religious Studies 45	Spanish 3Y	
Middle East/S. Asian Std 150	Religious Studies 60	Spanish 8	
Middle East/S. Asian Std 151A	Religious Studies 65C	Spanish 21	
Middle East/S. Asian Std 180	Religious Studies 67	Spanish 21S	
Middle East/S. Asian Std 181A	Religious Studies 68	Spanish 21V	
Middle East/S. Asian Std 181B	Religious Studies 69	Spanish 21Y	
Music 10	Religious Studies 70	Spanish 22	
Music 11	Religious Studies 100	Spanish 22S	
Music 110A	Religious Studies 102	Spanish 22V	
Music 110B	Religious Studies 103	Spanish 22Y	
Music 110C	Religious Studies 105	Spanish 23	
Music 110D	Religious Studies 106	Spanish 23S	
Music 110E	Religious Studies 111	Spanish 24	
Music 110G	Religious Studies 115	Spanish 24S	
Music 116	Religious Studies 120	Spanish 28	
Music 123	Religious Studies 125	Spanish 31	
Music 127	Religious Studies 126	Spanish 32	
Music 129A	Religious Studies 130	Spanish 33	
Music 129B	Religious Studies 131	Spanish 100	
Music 129C	Religious Studies 132	Spanish 100S	
Music 129D	Religious Studies 134	Spanish 130	
Native American Studies 1	Religious Studies 138	Spanish 131N	
Native American Studies 7	Religious Studies 140	Spanish 132	
Native American Studies 10	Religious Studies 141A	Spanish 133N	
Native American Studies 12	Religious Studies 141B	Spanish 134A	
Native American Studies 34	Religious Studies 141C	Spanish 134B	
Native American Studies 118	Religious Studies 143	Spanish 135N	
Native American Studies 121	Religious Studies 144	Spanish 136N	
Native American Studies 123	Religious Studies 150	Spanish 137N	
Native American Studies 125	Religious Studies 154	Spanish 138N	
Native American Studies 130A	Religious Studies 156	Spanish 139	
Native American Studies 133A	Religious Studies 157	Spanish 140N	
Native American Studies 184	Religious Studies 158	Spanish 141	
Native American Studies 185	Religious Studies 160	Spanish 141S	
Persian 1	Religious Studies 161	Spanish 142	
Philosophy 11	Religious Studies 161B	Spanish 143	American Studies 155
Philosophy 145	Religious Studies 162	Spanish 144	American Studies 156
Political Science 2	Religious Studies 163	Spanish 148	American Studies 157
Political Science 3	Religious Studies 166	Spanish 148S	American Studies 158
Political Science 4	Religious Studies 170	Spanish 149	Animal Genetics 111
Political Science 116	Religious Studies 175A	Spanish 150N	Animal Science 1
Political Science 118A	Russian 1	Spanish 151	Animal Science 2
Political Science 118B	Russian 2	Spanish 151N	Animal Science 18
Political Science 118C	Russian 3	Spanish 153	Animal Science 41L

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

## Writing Experience

### (WE)

Afr Am & Afr Std 10

Afr Am & Afr Std 12

Afr Am & Afr Std 17

Afr Am & Afr Std 50

Afr Am & Afr Std 145B

Afr Am & Afr Std 152

Afr Am & Afr Std 153

Afr Am & Afr Std 157

Afr Am & Afr Std 162

Afr Am & Afr Std 163

Afr Am & Afr Std 169

Afr Am & Afr Std 170

Afr Am & Afr Std 172

Afr Am & Afr Std 175A

Afr Am & Afr Std 180

Afr Am & Afr Std 185

Agricul & Res Econ 15

Agricul & Res Econ 194HA

Agricul & Res Econ 194HB

American Studies 1A

American Studies 1B

American Studies 1C

American Studies 1E

American Studies 5

American Studies 10

American Studies 21

American Studies 25

American Studies 30

American Studies 55

American Studies 59

American Studies 110

American Studies 120

American Studies 130

American Studies 139

American Studies 151

American Studies 152

American Studies 153

American Studies 154

American Studies 155

American Studies 156

American Studies 157

American Studies 158

Animal Genetics 111

Animal Science 1

Animal Science 2

Animal Science 18

Animal Science 41L

Animal Science 42	Art History 120A	Chicano Studies 121	Comparative Literature 3
Animal Science 106	Art History 130	Chicano Studies 122	Comparative Literature 4
Animal Science 115	Art History 148	Chicano Studies 122S	Comparative Literature 5
Animal Science 123	Art History 151	Chicano Studies 123	Comparative Literature 6
Animal Science 127	Art History 154	Chicano Studies 125S	Comparative Literature 7
Animal Science 131	Art History 163A	Chicano Studies 130	Comparative Literature 8
Animal Science 136	Art History 163B	Chicano Studies 131	Comparative Literature 9
Animal Science 137	Art History 163C	Chicano Studies 131S	Comparative Literature 11
Animal Science 139	Art History 163D	Chicano Studies 132	Comparative Literature 12
Animal Science 142	Art History 168	Chicano Studies 135S	Comparative Literature 13
Animal Science 144	Art History 172A	Chicano Studies 145S	Comparative Literature 14
Animal Science 146	Art History 173	Chicano Studies 147S	Comparative Literature 20
Animal Science 148	Art History 175	Chicano Studies 150	Comparative Literature 24
Animal Science 170	Art History 176A	Chicano Studies 154	Comparative Literature 25
Animal Science 194HC	Art History 176B	Chicano Studies 155	Comparative Literature 53A
Anthropology 1	Art History 176C	Chicano Studies 156	Comparative Literature 53B
Anthropology 1Y	Art History 177	Chicano Studies 157	Comparative Literature 53C
Anthropology 2	Art History 178B	Chicano Studies 160	Comparative Literature 100
Anthropology 4	Art History 178C	Chicano Studies 161	Comparative Literature 110
Anthropology 5	Art History 179B	Chicano Studies 165	Comparative Literature 120
Anthropology 13	Art History 182	Chicano Studies 170	Comparative Literature 135
Anthropology 15	Art History 183A	Chicano Studies 181	Comparative Literature 138
Anthropology 20	Art History 183B	Chicano Studies 182	Comparative Literature 139
Anthropology 23	Art History 183C	Chicano Studies 184	Comparative Literature 140
Anthropology 24	Art History 184	Chicano Studies 184S	Comparative Literature 141
Anthropology 32	Art History 186	Chicano Studies 194HA	Comparative Literature 142
Anthropology 50	Art History 187	Chicano Studies 194HB	Comparative Literature 144
Anthropology 54	Art History 188A	Chicano Studies 194HC	Comparative Literature 145
Anthropology 100	Art History 188B	Chinese 150	Comparative Literature 146
Anthropology 101	Art History 188C	Chinese 194H	Comparative Literature 147
Anthropology 103	Art History 190A	Cinema & Technocultural Stud 40A	Comparative Literature 148
Anthropology 104N	Art History 190B	Cinema & Technocultural Stud 40B	Comparative Literature 151
Anthropology 105	Art History 190C	Cinema & Technocultural Stud 41A	Comparative Literature 152
Anthropology 109	Art History 190D	Cinema & Technocultural Stud 41B	Comparative Literature 152S
Anthropology 110	Art History 190E	Cinema & Technocultural Stud 146A	Comparative Literature 153
Anthropology 117	Art History 190F	Cinema & Technocultural Stud 148B	Comparative Literature 154
Anthropology 120	Art History 190G	Cinema & Technocultural Stud 150	Comparative Literature 155
Anthropology 121	Art History 190H	Cinema & Technocultural Stud 162	Comparative Literature 156
Anthropology 122A	Art History 190I	Classics 1	Comparative Literature 157
Anthropology 122B	Art History 190J	Classics 2	Comparative Literature 158
Anthropology 123AN	Art History 190K	Classics 3	Comparative Literature 159
Anthropology 124	Art History 190L	Classics 4	Comparative Literature 160A
Anthropology 125A	Art Studio 24	Classics 15	Comparative Literature 160B
Anthropology 125B	Art Studio 148	Classics 20	Comparative Literature 161A
Anthropology 126A	Art Studio 190	Classics 25	Comparative Literature 161B
Anthropology 126B	Asian American Studies 1	Classics 50	Comparative Literature 162
Anthropology 127	Asian American Studies 2	Classics 51	Comparative Literature 163
Anthropology 128A	Asian American Studies 4	Classics 101A	Comparative Literature 164A
Anthropology 128B	Asian American Studies 100	Classics 101B	Comparative Literature 164B
Anthropology 129	Asian American Studies 112	Classics 101C	Comparative Literature 164C
Anthropology 130A	Asian American Studies 113	Classics 101D	Comparative Literature 164D
Anthropology 130BN	Asian American Studies 115	Classics 101E	Comparative Literature 165
Anthropology 132	Asian American Studies 116	Classics 102	Comparative Literature 165S
Anthropology 134	Asian American Studies 121	Classics 105	Comparative Literature 166
Anthropology 136	Asian American Studies 130	Classics 110	Comparative Literature 166A
Anthropology 138	Asian American Studies 141	Classics 120	Comparative Literature 166B
Anthropology 139AN	Asian American Studies 150B	Classics 125	Comparative Literature 167
Anthropology 139BN	Asian American Studies 150E	Classics 140	Comparative Literature 168A
Anthropology 140A	Asian American Studies 150F	Classics 141	Comparative Literature 168B
Anthropology 140B	Asian American Studies 189E	Classics 142	Comparative Literature 169
Anthropology 141B	Asian American Studies 189I	Classics 143	Comparative Literature 170
Anthropology 142	Atmospheric Science 116	Classics 150	Comparative Literature 172
Anthropology 143A	Avian Sciences 123	Classics 172A	Comparative Literature 175
Anthropology 144	Biological Sciences 10	Classics 173	Comparative Literature 180
Anthropology 145	Biological Sciences 122	Classics 175	Comparative Literature 180S
Anthropology 146N	Biological Sciences 122P	Classics 190	Comparative Literature 194H
Anthropology 148A	Biological Sciences 124	Communication 1	Comparative Literature 195
Anthropology 149A	Biological Sciences 132	Communication 139	Consumer Sciences 100
Anthropology 149B	Biological Sciences 133	Communication 143	Critical Theory 101
Anthropology 151	Biological Sciences 194H	Communication 144	Design 40A
Anthropology 152	Biotechnology 171	Communication 189A	Design 40B
Anthropology 153	Biotechnology 188	Communication 189B	Design 40C
Anthropology 154A	Biotechnology 194H	Communication 189C	Design 138
Anthropology 154B	Chemistry 115	Communication 189D	Design 144
Anthropology 154CL	Chemistry 125	Communication 194H	Design 145
Anthropology 158	Chemistry 150	Comm & Reg Devlpmnt 1	Dramatic Art 1
Anthropology 170	Chicano Studies 10	Comm & Reg Devlpmnt 2	Dramatic Art 5
Anthropology 172	Chicano Studies 21	Comm & Reg Devlpmnt 20	Dramatic Art 20
Anthropology 173	Chicano Studies 21S	Comm & Reg Devlpmnt 118	Dramatic Art 142
Anthropology 174	Chicano Studies 23	Comm & Reg Devlpmnt 140	Dramatic Art 150
Anthropology 175	Chicano Studies 30	Comm & Reg Devlpmnt 141	Dramatic Art 154
Anthropology 176	Chicano Studies 40	Comm & Reg Devlpmnt 142	Dramatic Art 155
Anthropology 177	Chicano Studies 40S	Comm & Reg Devlpmnt 147	Dramatic Art 156AN
Anthropology 178	Chicano Studies 50	Comm & Reg Devlpmnt 149	Dramatic Art 156B
Anthropology 182	Chicano Studies 60	Comm & Reg Devlpmnt 151	Dramatic Art 156C
Anthropology 183	Chicano Studies 65	Comm & Reg Devlpmnt 152	Dramatic Art 156D
Anthropology 184	Chicano Studies 70	Comm & Reg Devlpmnt 153A	Dramatic Art 158
Anthropology 186A	Chicano Studies 100	Comm & Reg Devlpmnt 154	Dramatic Art 159
Anthropology 194H	Chicano Studies 110	Comm & Reg Devlpmnt 156	Dramatic Art 159S
Applied Biological System Tech 110L	Chicano Studies 111	Comm & Reg Devlpmnt 157	Dramatic Art 160A
Applied Biological System Tech 163	Chicano Studies 112	Comm & Reg Devlpmnt 164	Dramatic Art 160B
Arabic 101A	Chicano Studies 113	Comm & Reg Devlpmnt 176	Dramatic Art 195
Arabic 140	Chicano Studies 114	Comm & Reg Devlpmnt 180	Education 81
Art History 1DY	Chicano Studies 114S	Comparative Literature 1	Education 110
Art History 110	Chicano Studies 120	Comparative Literature 2	Education 119

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Education 120	English 150A	Film Studies 1	Geology 194B
Education 122	English 150B	Film Studies 45	Geology 194HA
Education 130	English 153	Film Studies 120	Geology 194HB
Education 147	English 155A	Film Studies 121	German 10
Education 150	English 155B	Film Studies 121S	German 11
Education 152	English 155C	Film Studies 124	German 20
Education 181	English 156	Film Studies 125	German 21
Education 183	English 158A	Film Studies 127	German 22
Engineering 45	English 158B	Film Studies 129	German 40
Engineering 111	English 159	Film Studies 142	German 45
Engineering 121	English 160	Film Studies 176A	German 48
Engr: Aerospace Sci 127	English 161A	Film Studies 176B	German 101A
Engr: Aerospace Sci 130B	English 161B	Film Studies 189	German 103
Engr: Biological Systems 75	English 162	Film Studies 195H	German 104
Engr: Biological Systems 114	English 163	Film Studies 196H	German 105
Engr: Biological Systems 120	English 164	Food Science & Technology 55	German 112
Engr: Biological Systems 125	English 165	Food Science & Technology 101A	German 113
Engr: Biological Systems 127	English 166	Food Science & Technology 101B	German 114
Engr: Biological Systems 128	English 167	Food Science & Technology 103	German 115
Engr: Biological Systems 135	English 168	Food Science & Technology 104L	German 116
Engr: Biological Systems 165	English 171A	Food Science & Technology 107	German 117
Engr: Biological Systems 170A	English 171B	Food Science & Technology 123L	German 118B
Engr: Biological Systems 170B	English 173	Food Science & Technology 127	German 118C
Engr: Biological Systems 170BL	English 175	Food Science & Technology 159	German 118E
Engr: Biological Systems 170C	English 177	French 21	German 120
Engr: Biological Systems 170CL	English 178	French 21S	German 122
Engr: Biomedical 116	English 179	French 22	German 123
Engr: Biomedical 126	English 180	French 22S	German 125
Engr: Biomedical 173	English 181A	French 23	German 126
Engr: Chemical 145A	English 181B	French 23S	German 127
Engr: Chemical 145B	English 182	French 50	German 129
Engr: Chemical 155	English 183	French 51	German 131
Engr: Chemical 155A	English 184	French 52	German 132
Engr: Chemical 155B	English 185A	French 53	German 133
Engr: Chemical 158C	English 185B	French 100	German 134
Engr: Chemical 161L	English 185C	French 101	German 141
Engr: Civil & Environ 123	English 186	French 102	German 142
Engr: Civil & Environ 137	English 189	French 103	German 143
Engr: Civil & Environ 143	English 194H	French 105	German 160
Engr: Civil & Environ 148B	English 195H	French 105S	German 168
Engr: Civil & Environ 155	Entomology 1	French 106	German 176A
Engr: Civil & Environ 163	Entomology 2	French 107	German 185
Engr: Computer Science 15	Entomology 100	French 107A	Greek 101
Engr: Computer Science 188	Entomology 102	French 107B	Greek 102
Engr: Materials Science 162L	Entomology 105	French 107S	Greek 103A
Engr: Materials Science 172L	Entomology 110	French 108	Greek 103B
Engr: Materials Science 174L	Entomology 117	French 110	Greek 104
Engr: Materials Science 180	Entomology 119	French 115	Greek 105
Engr: Materials Science 181	Entomology 123	French 116	Greek 110
Engr: Materials Science 182	Entomology 153	French 117A	Greek 111
Engr: Materials Science 188A	Entomology 158	French 117B	Greek 112
Engr: Materials Science 188B	Entomology 180B	French 118A	Greek 113
Engr: Mechanical 108	Environmental Horticulture 120	French 118B	Greek 114
Engr: Mechanical 150A	Environmental Horticulture 125	French 119A	Greek 115
Engr: Mechanical 185A	Environmental Horticulture 160	French 119B	Greek 116
Engr: Mechanical 185B	Environmental Sci & Management 8	French 119C	Greek 130
English 3	Environmental Sci & Management 141	French 120	History 1
English 4	Environmental Sci & Management 194H	French 121	History 3
English 5F	Environ Science & Policy 10	French 122	History 4A
English 5NF	Environ Science & Policy 101	French 124	History 4B
English 10A	Environ Science & Policy 105	French 125	History 4C
English 10B	Environ Science & Policy 163	French 125S	History 6
English 10C	Environ Science & Policy 171	French 127	History 7A
English 40	Environmental Toxicology 102A	French 128	History 7B
English 41	Environmental Toxicology 103B	French 128S	History 7C
English 42	Environmental Toxicology 110	French 130	History 8
English 43	Environmental Toxicology 120	French 133	History 9A
English 44	Environmental Toxicology 127	French 140	History 9B
English 45	Environmental Toxicology 130	French 141	History 10A
English 105	Environmental Toxicology 138	French 141S	History 10B
English 107	Evolution and Ecology 2	French 160	History 10C
English 110A	Evolution and Ecology 11	French 162	History 11
English 110B	Evolution and Ecology 106	French 194H	History 12
English 111	Evolution and Ecology 110	French 195H	History 15
English 113A	Evolution and Ecology 114	Geology 1	History 17A
English 113B	Evolution and Ecology 115	Geology 3G	History 17B
English 115	Evolution and Ecology 138	Geology 4	History 72A
English 117	Evolution and Ecology 141	Geology 16G	History 72B
English 120	Evolution and Ecology 147	Geology 18	History 80
English 122	Evolution and Ecology 149	Geology 18V	History 85
English 123	Evolution and Ecology 150	Geology 36	History 101
English 125	Evolution and Ecology 180B	Geology 81	History 102A
English 130	Evolution and Ecology 181	Geology 103	History 102B
English 133	Evolution and Ecology 194HA	Geology 105	History 102D
English 137	Evolution and Ecology 194HB	Geology 106	History 102E
English 138	Evolution and Ecology 194HC	Geology 108	History 102F
English 139	Exercise Biology 104L	Geology 109L	History 102G
English 140	Exercise Biology 115	Geology 110	History 102H
English 141	Exercise Biology 126	Geology 115	History 102I
English 142	Fiber And Polymer Science 110	Geology 134	History 102J
English 143	Fiber And Polymer Science 150	Geology 136	History 102K
English 144	Fiber And Polymer Science 161	Geology 144	History 102L
English 146	Fiber And Polymer Science 161L	Geology 181	History 102M
English 147	Fiber And Polymer Science 180A	Geology 183	History 102N
English 149	Fiber And Polymer Science 180B	Geology 194A	History 102O

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

History 102P	History 174C	Italian 131	Music 24C
History 102Q	History 174D	Italian 139B	Music 28
History 102R	History 175	Italian 140	Music 105
History 102S	History 176A	Italian 141	Music 106
History 102X	History 176B	Italian 142	Music 110A
History 103	History 177A	Italian 145	Music 110B
History 104A	History 177B	Italian 145S	Music 110C
History 104B	History 178A	Italian 150	Music 110D
History 104C	History 178B	Italian 190X	Music 110E
History 105	History 179	Italian 195H	Music 110F
History 110	History 180AN	Japanese 10	Music 110G
History 110A	History 180BN	Japanese 25	Music 115
History 111A	History 181	Japanese 101	Music 123
History 111B	History 182	Japanese 102	Music 124A
History 111C	History 183A	Japanese 121	Music 124B
History 112A	History 183B	Japanese 122	Music 126
History 112B	History 184	Japanese 123	Music 129A
History 112C	History 185A	Japanese 151	Music 129B
History 113	History 185B	Japanese 152	Music 129C
History 115A	History 188	Japanese 153	Music 129D
History 115B	History 189	Japanese 154	Native American Studies 1
History 115C	History 190A	Japanese 156	Native American Studies 5
History 115D	History 190B	Japanese 157	Native American Studies 7
History 115E	History 190C	Japanese 194H	Native American Studies 10
History 115F	History 190D	Jewish Studies 10	Native American Studies 12
History 116	History 191A	Jewish Studies 101	Native American Studies 33
History 119	History 191B	Jewish Studies 110	Native American Studies 101
History 120	History 191C	Jewish Studies 111	Native American Studies 108
History 121A	History 191D	Jewish Studies 112	Native American Studies 115
History 121B	History 191E	Jewish Studies 116	Native American Studies 118
History 121C	History 191F	Jewish Studies 120	Native American Studies 119
History 122	History 191G	Landscape Architecture 1	Native American Studies 121
History 125	History 191H	Landscape Architecture 2	Native American Studies 122
History 130A	History 191J	Landscape Architecture 3	Native American Studies 125
History 130B	History 193A	Landscape Architecture 30	Native American Studies 130A
History 130C	History 193B	Landscape Architecture 50	Native American Studies 130B
History 131A	History 193D	Landscape Architecture 102	Native American Studies 130C
History 131B	History 194A	Landscape Architecture 142	Native American Studies 133A
History 131C	History 194B	Landscape Architecture 180F	Native American Studies 133B
History 132	History 194C	Landscape Architecture 180K	Native American Studies 134
History 133	History 194D	Latin 101	Native American Studies 135
History 134A	History 194E	Latin 102	Native American Studies 146
History 135A	History 195B	Latin 103	Native American Studies 157
History 135B	History 196A	Latin 104	Native American Studies 161
History 136	History 196B	Latin 105	Native American Studies 162
History 138A	Honors Challenge 94	Latin 106	Native American Studies 180
History 138B	Human Development 101	Latin 108	Native American Studies 181A
History 138C	Human Development 102	Latin 109	Native American Studies 181B
History 139A	Human Development 117	Latin 110	Native American Studies 181C
History 139B	Human Development 120	Latin 112	Native American Studies 188
History 140	Human Development 161	Latin 115	Native American Studies 191
History 141	Human Rights 1	Latin 116	Nematology 10V
History 142A	Human Rights 120A	Latin 118	Neuro, Physio & Behavior 106
History 142B	Human Rights 130	Latin 119	Neuro, Physio & Behavior 111C
History 143	Human Rights 131	Latin 120	Neuro, Physio & Behavior 140
History 144A	Human Rights 134	Latin 125	Neuro, Physio & Behavior 141
History 144B	Human Rights 136	Latin 130	Neuro, Physio & Behavior 141P
History 145	Human Rights 138	Law 224	Neuro, Physio & Behavior 142
History 146A	Human Rights 161	Law 285BT	Nutrition 11
History 146B	Humanities 1D	Linguistics 6	Nutrition 115
History 147A	Humanities 2A	Linguistics 160	Nutrition 117
History 147B	Humanities 2B	Linguistics 163	Nutrition 127
History 147C	Humanities 3	Linguistics 165	Nutrition 129
History 148A	Humanities 4D	Linguistics 180	Philosophy 1
History 148B	Humanities 7	Linguistics 182	Philosophy 5
History 148C	Humanities 8	Mathematics 189	Philosophy 11
History 149	Humanities 9D	Med - Public Health Sciences 175W	Philosophy 13G
History 151A	Humanities 13	Medieval Studies 20A	Philosophy 14
History 151B	Humanities 15	Medieval Studies 20B	Philosophy 15
History 151C	Humanities 60	Medieval Studies 130A	Philosophy 16
History 151D	Humanities 180	Medieval Studies 130B	Philosophy 17
History 159	International Agricultural Dev 10	Medieval Studies 131	Philosophy 21
History 160	International Agricultural Dev 103	Medieval Studies 189	Philosophy 22
History 161	International Relations 1	Microbiology 104L	Philosophy 24
History 162	International Relations 190	Microbiology 105L	Philosophy 30
History 163A	International Relations 192	Middle East/S. Asian Std 100	Philosophy 31
History 163B	International Relations 194HA	Middle East/S. Asian Std 111A	Philosophy 32
History 164	International Relations 194HB	Middle East/S. Asian Std 121A	Philosophy 38
History 165	Italian 50	Middle East/S. Asian Std 121C	Philosophy 101
History 166A	Italian 101	Middle East/S. Asian Std 122A	Philosophy 102
History 166B	Italian 101S	Middle East/S. Asian Std 131A	Philosophy 103
History 167	Italian 107	Middle East/S. Asian Std 131C	Philosophy 104
History 168	Italian 107S	Middle East/S. Asian Std 151A	Philosophy 105
History 169A	Italian 108	Middle East/S. Asian Std 180	Philosophy 107
History 169B	Italian 108S	Middle East/S. Asian Std 181A	Philosophy 108
History 170A	Italian 112	Middle East/S. Asian Std 181B	Philosophy 109
History 170B	Italian 113	Middle East/S. Asian Std 182C	Philosophy 111
History 170C	Italian 114	Molecular and Cellular Biology 120L	Philosophy 114
History 171A	Italian 115D	Molecular and Cellular Biology 144	Philosophy 115
History 171B	Italian 119	Molecular and Cellular Biology 160L	Philosophy 116
History 171D	Italian 120A	Molecular and Cellular Biology 194	Philosophy 117
History 172	Italian 120B	Molecular and Cellular Biology 194H	Philosophy 118
History 173	Italian 121	Music 10	Philosophy 119
History 174A	Italian 121S	Music 24A	Philosophy 120
History 174B	Italian 128	Music 24B	Philosophy 121

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Philosophy 123	Political Science 147B	Religious Studies 115	Spanish 123
Philosophy 125	Political Science 147C	Religious Studies 120	Spanish 133N
Philosophy 129	Political Science 147D	Religious Studies 122	Spanish 134A
Philosophy 131	Political Science 148A	Religious Studies 125	Spanish 134B
Philosophy 137A	Political Science 148B	Religious Studies 130	Spanish 136N
Philosophy 137B	Political Science 148C	Religious Studies 131	Spanish 137N
Philosophy 137C	Political Science 150	Religious Studies 132	Spanish 140N
Philosophy 141	Political Science 151	Religious Studies 134	Spanish 142
Philosophy 143	Political Science 152	Religious Studies 138	Spanish 147
Philosophy 151	Political Science 153	Religious Studies 140	Spanish 149
Philosophy 156	Political Science 154	Religious Studies 141A	Spanish 170
Philosophy 157	Political Science 155	Religious Studies 141B	Spanish 170S
Philosophy 160	Political Science 160	Religious Studies 141C	Spanish 175
Philosophy 161	Political Science 162	Religious Studies 143	Spanish 178A
Philosophy 162	Political Science 163	Religious Studies 144	Spanish 180
Philosophy 168	Political Science 164	Religious Studies 145	Spanish 181
Philosophy 170	Political Science 165	Religious Studies 150	Spanish 182
Philosophy 172	Political Science 166	Religious Studies 154	Spanish 194H
Philosophy 174	Political Science 168	Religious Studies 156	Spanish 198
Philosophy 175	Political Science 170	Religious Studies 157	Spanish 199
Philosophy 178	Political Science 171	Religious Studies 158	Technocultural Studies 1
Philosophy 189A	Political Science 172	Religious Studies 160	Technocultural Studies 5
Philosophy 189B	Political Science 174	Religious Studies 161	Technocultural Studies 158
Philosophy 189C	Political Science 175	Religious Studies 161B	Technocultural Studies 160
Philosophy 189D	Political Science 176	Religious Studies 162	Technocultural Studies 190
Philosophy 189E	Political Science 179	Religious Studies 163	Technocultural Studies 191
Philosophy 189F	Political Science 180	Religious Studies 166	Textiles & Clothing 7
Philosophy 189G	Political Science 183	Russian 102	Textiles & Clothing 107
Philosophy 189H	Political Science 187	Russian 122	Textiles & Clothing 162L
Philosophy 189I	Political Science 190	Russian 124	Textiles & Clothing 163L
Physics 116C	Political Science 192A	Russian 126	Textiles & Clothing 180A
Physics 122A	Political Science 192B	Russian 129	Textiles & Clothing 180B
Physics 122B	Political Science 193	Russian 130	University Writing Program 1
Physics 157	Political Science 193W	Russian 133	University Writing Program 1V
Plant Biology 123	Political Science 194HA	Russian 139	University Writing Program 1Y
Plant Biology 143	Political Science 194HB	Russian 140	University Writing Program 10
Plant Pathology 123	Political Science 195	Russian 141	University Writing Program 11
Plant Science 12	Political Science 196A	Russian 142	University Writing Program 12
Plant Science 141	Political Science 196B	Russian 143	University Writing Program 18
Plant Science 188	Political Science 196C	Russian 150	University Writing Program 19
Plant Science 194H	Political Science 196D	Russian 192	University Writing Program 98
Political Science 1	Political Science 196E	Science & Tech Studies 1	University Writing Program 99
Political Science 2	Portuguese 23	Science & Tech Studies 20	University Writing Program 100
Political Science 3	Portuguese 100	Science & Tech Studies 32	University Writing Program 101
Political Science 4	Portuguese 159	Science & Tech Studies 40A	University Writing Program 102A
Political Science 5	Portuguese 161	Science & Tech Studies 40B	University Writing Program 102B
Political Science 7	Portuguese 162	Science & Tech Studies 50	University Writing Program 102C
Political Science 51	Portuguese 163	Science & Tech Studies 51	University Writing Program 102D
Political Science 100	Portuguese 198	Science & Tech Studies 108	University Writing Program 102E
Political Science 102	Psychology 132	Science & Tech Studies 109	University Writing Program 102F
Political Science 104	Psychology 136	Science & Tech Studies 121	University Writing Program 102G
Political Science 105	Psychology 141	Science & Tech Studies 129	University Writing Program 102H
Political Science 106	Psychology 142	Science & Tech Studies 130A	University Writing Program 102I
Political Science 107	Psychology 143	Science & Tech Studies 130B	University Writing Program 102J
Political Science 108	Psychology 146	Science & Tech Studies 131	University Writing Program 102K
Political Science 109	Psychology 158	Science & Tech Studies 150	University Writing Program 102L
Political Science 110	Psychology 170	Science & Tech Studies 151	University Writing Program 102M
Political Science 112	Psychology 175	Science & Tech Studies 160	University Writing Program 104A
Political Science 113	Psychology 185	Science & Tech Studies 161	University Writing Program 104B
Political Science 114	Psychology 194HA	Science & Tech Studies 162	University Writing Program 104C
Political Science 115	Psychology 194HB	Science & Tech Studies 163	University Writing Program 104D
Political Science 116	Religious Studies 1	Science & Tech Studies 164	University Writing Program 104E
Political Science 117	Religious Studies 1A	Science & Tech Studies 173	University Writing Program 104F
Political Science 118A	Religious Studies 1B	Science & Tech Studies 175	University Writing Program 104FY
Political Science 118B	Religious Studies 1C	Science & Society 1	University Writing Program 104I
Political Science 118C	Religious Studies 1D	Science & Society 7	University Writing Program 104J
Political Science 119	Religious Studies 1E	Science and Society 7V	University Writing Program 104T
Political Science 120	Religious Studies 1F	Science and Society 8	University Writing Program 110
Political Science 121	Religious Studies 1G	Science and Society 9	University Writing Program 111A
Political Science 122	Religious Studies 1H	Science and Society 11	University Writing Program 111B
Political Science 123	Religious Studies 10	Science and Society 12	University Writing Program 111C
Political Science 124	Religious Studies 10A	Science and Society 20	University Writing Program 112A
Political Science 126	Religious Studies 11	Science and Society 25	University Writing Program 120
Political Science 129	Religious Studies 12	Science and Society 25V	University Writing Program 121
Political Science 130	Religious Studies 15Y	Science and Society 40	University Writing Program 198
Political Science 131	Religious Studies 21	Science and Society 41	University Writing Program 199
Political Science 132	Religious Studies 23	Science and Society 110	Viticulture & Enology 111
Political Science 135	Religious Studies 30	Sociology 185Y	Viticulture & Enology 123L
Political Science 136	Religious Studies 40	Sociology 193	Viticulture & Enology 124
Political Science 137	Religious Studies 42	Sociology 194H	Viticulture & Enology 124L
Political Science 140A	Religious Studies 45	Soil Science 105	Viticulture & Enology 125L
Political Science 140B	Religious Studies 60	Soil Science 109	Viticulture & Enology 126L
Political Science 140C	Religious Studies 65C	Soil Science 111	Viticulture & Enology 128L
Political Science 140D	Religious Studies 67	Spanish 21V	Washington Center 175
Political Science 140E	Religious Studies 68	Spanish 22V	Washington Center 193
Political Science 142A	Religious Studies 69	Spanish 23	Wild, Fish & Conserv Biol 10
Political Science 142B	Religious Studies 70	Spanish 23S	Wild, Fish & Conserv Biol 50
Political Science 142C	Religious Studies 80	Spanish 24	Wild, Fish & Conserv Biol 101
Political Science 143A	Religious Studies 100	Spanish 24S	Wild, Fish & Conserv Biol 102L
Political Science 143B	Religious Studies 102	Spanish 31	Wild, Fish & Conserv Biol 121
Political Science 144A	Religious Studies 103	Spanish 32	Wild, Fish & Conserv Biol 153
Political Science 144B	Religious Studies 105	Spanish 33	Wild, Fish & Conserv Biol 154
Political Science 146A	Religious Studies 106	Spanish 100	Wild, Fish & Conserv Biol 155
Political Science 146B	Religious Studies 110	Spanish 100S	Wild, Fish & Conserv Biol 156
Political Science 147A	Religious Studies 111	Spanish 110	Women's Studies 20

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Women's Studies 25	Women's Studies 138	Women's Studies 175	Women's Studies 184
Women's Studies 50	Women's Studies 139	Women's Studies 178A	Women's Studies 187
Women's Studies 60	Women's Studies 145	Women's Studies 178B	Women's Studies 189
Women's Studies 70	Women's Studies 146	Women's Studies 178C	Women's Studies 191
Women's Studies 102	Women's Studies 148	Women's Studies 178D	Women's Studies 193
Women's Studies 103	Women's Studies 158	Women's Studies 178E	Women's Studies 194HA
Women's Studies 104	Women's Studies 160	Women's Studies 178F	Women's Studies 194HB
Women's Studies 130	Women's Studies 162	Women's Studies 179	Women's Studies 195
Women's Studies 136	Women's Studies 164	Women's Studies 180	
Women's Studies 137	Women's Studies 170	Women's Studies 182	

## FORMER GENERAL EDUCATION COURSES; PRE-FALL 2011

The following section pertains to students who matriculated to UC Davis prior to Fall 2011. Students who matriculated for the first time in Fall 2011 or later should refer to the [New General Education Courses; Fall 2011 and On, on page 592](#).

For the most up-to-date General Education courses, use the class search tool at <http://classes.ucdavis.edu/>.

### TOPICAL BREADTH

These courses provide GE credit for topical breadth. Many of these courses also satisfy the GE requirement for social-cultural diversity (indicated by **D**) and/or provide GE credit for writing experience (indicated by **W**). Complete lists of the courses that satisfy the social-cultural diversity requirement and the courses that provide writing experience credit follow this list.

### Arts & Humanities (ArtHum)

Afr Am & Afr Std 12 † ..... D..W	Anthropology 134 † ..... D..W	Art History 189D ..... W	Asian American Studies 4D ..... W
Afr Am & Afr Std 15D ..... W	Anthropology 145 † ..... D..W	Art History 190A	Asian American Studies 100 † ..... D
Afr Am & Afr Std 16D ..... W	Anthropology 186A †	Art History 190B	Asian American Studies 112 † ..... D
Afr Am & Afr Std 18 †	Arabic 1	Art History 190C	Asian American Studies 113 †
Afr Am & Afr Std 50D ..... W	Arabic 1A	Art History 190D	Asian American Studies 116 † ..... D
Afr Am & Afr Std 51	Arabic 2	Art History 190F	Asian American Studies 121
Afr Am & Afr Std 52D ..... W	Arabic 3	Art History 190G	Asian American Studies 130D
Afr Am & Afr Std 100	Arabic 21	Art History 190H	Asian American Studies 141 † ..... D
Afr Am & Afr Std 107AD ..... W	Arabic 21C	Art History 190I	Asian American Studies 150B † ..... D..W
Afr Am & Afr Std 107BD ..... W	Arabic 22C	Art History 190K	Asian American Studies 150C † ..... D
Afr Am & Afr Std 107C † ..... D..W	Arabic 23	Art History 190L	Asian American Studies 150D † ..... D
Afr Am & Afr Std 107D † ..... D..W	Arabic 23C	Art History 210 ..... W	Asian American Studies 150E † ..... D
Afr Am & Afr Std 111 † ..... D..W	Arabic 23C	Art Studio 2	Asian American Studies 150F † ..... D
Afr Am & Afr Std 123 † ..... D	Arabic 140D ..... W	Art Studio 5	Asian American Studies 189B †
Afr Am & Afr Std 150AD	Arabic 141	Art Studio 8	Asian American Studies 189E †
Afr Am & Afr Std 150BD	Art History 1A	Art Studio 9	Asian American Studies 189H †
Afr Am & Afr Std 152D ..... W	Art History 1B	Art Studio 10	Asian American Studies 189I †
Afr Am & Afr Std 153D ..... W	Art History 1CD	Art Studio 11	Chicano Studies 10 † ..... D..W
Afr Am & Afr Std 155A	Art History 1DD	Art Studio 12	Chicano Studies 23 †
Afr Am & Afr Std 156D	Art History 1DYD	Art Studio 24	Chicano Studies 50D
Afr Am & Afr Std 157D ..... W	Art History 1ED	Art Studio 30D ..... W	Chicano Studies 60D
Afr Am & Afr Std 160D	Art History 5	Art Studio 30D	Chicano Studies 65D
Afr Am & Afr Std 162D ..... W	Art History 25 #	Art Studio 101	Chicano Studies 70D
Afr Am & Afr Std 163D ..... W	Art History 100 ..... W	Art Studio 102A	Chicano Studies 73
Afr Am & Afr Std 168D	Art History 110 ..... W	Art Studio 102B	Chicano Studies 111 †
Afr Am & Afr Std 169D	Art History 120A †	Art Studio 102C	Chicano Studies 150 † ..... D..W
Afr Am & Afr Std 170D ..... W	Art History 130	Art Studio 103A	Chicano Studies 154D
Afr Am & Afr Std 171D	Art History 148 ..... W	Art Studio 103B	Chicano Studies 155
Afr Am & Afr Std 175AD ..... W	Art History 150D	Art Studio 105A	Chicano Studies 156
Afr Am & Afr Std 175B	Art History 151D	Art Studio 110B	Chicano Studies 157
Afr Am & Afr Std 176 †	Art History 152D	Art Studio 110B	Chicano Studies 160D
Afr Am & Afr Std 177 †	Art History 154 †	Art Studio 111A	Chicano Studies 161 † ..... D..W
Afr Am & Afr Std 178 †	Art History 155 † ..... D..W	Art Studio 111B	Chicano Studies 165
Afr Am & Afr Std 180 † ..... D	Art History 156D ..... W	Art Studio 112	Chicano Studies 170
Afr Am & Afr Std 181	Art History 163AD ..... W	Art Studio 113	Chicano Studies 171
Afr Am & Afr Std 182D	Art History 163BD ..... W	Art Studio 114A	Chicano Studies 172
Afr Am & Afr Std 185D ..... W	Art History 163CD ..... W	Art Studio 114B	Chicano Studies 181 † ..... D..W
American Studies 1AD ..... W	Art History 163DD ..... W	Art Studio 114C	Chicano Studies 182 † ..... D..W
American Studies 1B † ..... D..W	Art History 164D ..... W	Art Studio 117	Chinese 1
American Studies 1C † ..... D..W	Art History 168 ..... W	Art Studio 121	Chinese 1A
American Studies 1E † ..... D..W	Art History 172A ..... W	Art Studio 125A	Chinese IBL
American Studies 5 † ..... W	Art History 172B ..... W	Art Studio 125B	Chinese 1CN
American Studies 10 † ..... D..W	Art History 173 ..... W	Art Studio 125C	Chinese 2
American Studies 21D ..... W	Art History 175D ..... W	Art Studio 125D	Chinese 2BL
American Studies 25 † ..... D..W	Art History 176A ..... W	Art Studio 129	Chinese 2CN
American Studies 30 † ..... D..W	Art History 176B ..... W	Art Studio 138	Chinese 3
American Studies 55 † ..... D..W	Art History 176C ..... W	Art Studio 142A	Chinese 3BL
American Studies 59 † ..... D..W	Art History 177 ..... W	Art Studio 142B	Chinese 3CN
American Studies 110 † ..... D..W	Art History 178B ..... W	Art Studio 142C	Chinese 4
American Studies 120 † ..... D..W	Art History 178C ..... W	Art Studio 147 ..... W	Chinese 4A
American Studies 130 † ..... D..W	Art History 179B ..... W	Art Studio 149D ..... W	Chinese 5
American Studies 139 † ..... D..W	Art History 182 ..... W	Art Studio 150 ..... W	Chinese 6
American Studies 151 † ..... D..W	Art History 183A ..... W	Art Studio 152B	Chinese 7 † ..... D
American Studies 152 † ..... D..W	Art History 183BD ..... W	Art Studio 152C	Chinese 10D ..... W
American Studies 153 † ..... D..W	Art History 183CD ..... W	Art Studio 152D	Chinese 101D
American Studies 154 † ..... D..W	Art History 184 ..... W	Art Studio 152E	Chinese 102D ..... W
American Studies 155 † ..... D..W	Art History 185D ..... W	Art Studio 152F	Chinese 103D ..... W
American Studies 156 † ..... D..W	Art History 186D ..... W	Art Studio 152G	Chinese 104D ..... W
American Studies 157 † ..... D..W	Art History 187D ..... W	Art Studio 171	Chinese 105D ..... W
American Studies 158	Art History 188AD ..... W	Art Studio 190	Chinese 106D ..... W
Anthropology 20 † ..... D	Art History 188B ..... W	Asian American Studies 1 † ..... D..W	Chinese 107D ..... W
Anthropology 30 †	Art History 188C ..... W	Asian American Studies 2 † ..... D..W	Chinese 108D ..... W

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Chinese 109AD.....	W	Comparative Literature 120.....	W	Design 180A.....		English 149.....	W
Chinese 109CD.....	W	Comparative Literature 135D.....	W	Design 180B.....		English 150A.....	W
Chinese 109DD.....	W	Comparative Literature 138D.....	W	Design 185.....		English 150B.....	W
Chinese 109ED.....	W	Comparative Literature 139.....		Design 186.....		English 153.....	W
Chinese 109GD.....	W	Comparative Literature 140.....	W	Design 187.....		English 155A.....	W
Chinese 109HD.....	W	Comparative Literature 141.....	W	Dramatic Art 1D.....	W	English 155B.....	W
Chinese 109ID.....	W	Comparative Literature 142.....		Dramatic Art 1SD.....	W	English 155C.....	W
Chinese 110D.....	W	Comparative Literature 144.....	W	Dramatic Art 2.....		English 156.....	W
Chinese 111.....		Comparative Literature 145D.....	W	Dramatic Art 5D.....		English 158A.....	W
Chinese 111A.....		Comparative Literature 146.....	W	Dramatic Art 20.....		English 158B.....	W
Chinese 112.....		Comparative Literature 147D.....	W	Dramatic Art 24.....		English 159.....	W
Chinese 113.....		Comparative Literature 148D.....	W	Dramatic Art 28.....		English 160.....	W
Chinese 114.....		Comparative Literature 151D.....	W	Dramatic Art 40A.....		English 161A.....	W
Chinese 115.....		Comparative Literature 152D.....	W	Dramatic Art 40B.....		English 161B.....	W
Chinese 116.....		Comparative Literature 152SD.....	W	Dramatic Art 43B.....		English 162.....	W
Chinese 120.....		Comparative Literature 153D.....	W	Dramatic Art 55.....		English 163.....	W
Chinese 130.....		Comparative Literature 154D.....	W	Dramatic Art 56A.....		English 164.....	W
Chinese 131.....		Comparative Literature 155D.....	W	Dramatic Art 56B.....		English 165.....	W
Chinese 132.....		Comparative Literature 156D.....	W	Dramatic Art 56C.....		English 166D.....	W
Chinese 133.....		Comparative Literature 157.....	W	Dramatic Art 111SD.....	W	English 167D.....	W
Chinese 134 †.....		Comparative Literature 158.....	W	Dramatic Art 114 †.....	D..W	English 168.....	W
Chinese 140.....		Comparative Literature 159D.....	W	Dramatic Art 116.....		English 171AD.....	W
Chinese 150D.....	W	Comparative Literature 160A.....	W	Dramatic Art 121C.....		English 171BD.....	W
Chinese 160.....		Comparative Literature 160B.....	W	Dramatic Art 122C.....		English 172 †.....	
Chinese 194H.....		Comparative Literature 161A.....	W	Dramatic Art 124A.....		English 173.....	W
Cinema & Technocultural Stud 12 †.....		Comparative Literature 161B.....	W	Dramatic Art 124B.....		English 175.....	W
Cinema & Technocultural Stud 20.....		Comparative Literature 162.....		Dramatic Art 124C.....		English 177.....	W
Cinema & Technocultural Stud 40A †.....		Comparative Literature 163.....	W	Dramatic Art 124D.....		English 178D.....	W
Cinema & Technocultural Stud 40B †.....		Comparative Literature 164A.....	W	Dramatic Art 124E.....		English 179D.....	W
Cinema & Technocultural Stud 41A.....		Comparative Literature 164B.....	W	Dramatic Art 125.....		English 180.....	W
Cinema & Technocultural Stud 41B.....		Comparative Literature 164C.....	W	Dramatic Art 130.....		English 181AD.....	W
Cinema & Technocultural Stud 116.....		Comparative Literature 164D.....	W	Dramatic Art 142.....		English 181BD.....	W
Cinema & Technocultural Stud 124E.....		Comparative Literature 165D.....	W	Dramatic Art 143.....		English 182D.....	W
Cinema & Technocultural Stud 146AD..W		Comparative Literature 165D.....	W	Dramatic Art 144 †.....	D	English 183.....	
Cinema & Technocultural Stud 147AD.....		Comparative Literature 166D.....	W	Dramatic Art 144A †.....		English 184.....	W
Cinema & Technocultural Stud 148BD..W		Comparative Literature 166A.....	W	Dramatic Art 144B †.....	D	English 185AD.....	W
Cinema & Technocultural Stud 150 †.....		Comparative Literature 166B.....	W	Dramatic Art 144C.....		English 185BD.....	W
Cinema & Technocultural Stud 162 †.....		Comparative Literature 167.....	W	Dramatic Art 150D.....	W	English 186D.....	W
Cinema & Technocultural Stud 172 †.....		Comparative Literature 168A.....	W	Dramatic Art 151S.....		English 189.....	W
Classics 1.....	W	Comparative Literature 168B.....	W	Dramatic Art 154D.....	W	English 194H.....	
Classics 2.....	W	Comparative Literature 169.....	W	Dramatic Art 155D.....	W	English 195H.....	
Classics 3.....		Comparative Literature 170.....	W	Dramatic Art 155A.....		Entomology 1 †.....	
Classics 4.....		Comparative Literature 172D.....	W	Dramatic Art 155B.....		Film Studies 1.....	W
Classics 10.....		Comparative Literature 175D.....	W	Dramatic Art 156AND.....	W	Film Studies 45.....	
Classics 10Y.....		Comparative Literature 180.....	W	Dramatic Art 156BD.....	W	Film Studies 120D.....	
Classics 15.....		Comparative Literature 180S.....	W	Dramatic Art 156CD.....	W	Film Studies 121D.....	
Classics 20.....	W	Comparative Literature 195.....		Dramatic Art 156DD.....	W	Film Studies 121S.....	
Classics 25.....	W	Critical Theory 101.....	W	Dramatic Art 159S.....		Film Studies 124.....	
Classics 30.....		Design 1.....		Dramatic Art 170.....		Film Studies 125.....	
Classics 30F.....		Design 14.....		Dramatic Art 180B.....		Film Studies 127.....	
Classics 31.....		Design 15.....		Dramatic Art 195.....		Film Studies 129D.....	
Classics 50.....	W	Design 16.....		East Asian Studies 88D.....	W	Film Studies 142.....	
Classics 101A.....		Design 21.....		East Asian Studies 113D.....	W	Film Studies 176A.....	
Classics 101B.....		Design 31.....		Education 147D.....	W	Film Studies 176B.....	
Classics 101C.....		Design 40A.....		Education 152 †.....		Film Studies 189.....	
Classics 101D.....		Design 40B.....		Engr: Computer Science 12 †.....		Food Science & Technology 55 † .. D..W	
Classics 102.....	W	Design 40C.....		English 3 *		Food Science & Technology 159 †.....	
Classics 105.....		Design 50.....		English 4 ..	W	French 1.....	
Classics 110.....	W	Design 70.....		English 5F ..	W	French 1A.....	
Classics 120.....		Design 77.....		English 5NF ..	W	French 15.....	
Classics 125.....		Design 107.....		English 5P ..		French 2.....	
Classics 140.....	W	Design 115.....		English 10A ..		French 25.....	
Classics 141.....	W	Design 116.....		English 10B ..		French 3.....	
Classics 142.....	W	Design 117.....		English 10C ..		French 35.....	
Classics 143.....	W	Design 127A.....		English 40 ..	W	French 21.....	
Classics 150.....		Design 127B.....		English 41 ..	W	French 21S.....	
Classics 171D.....	W	Design 131.....		English 42 ..	W	French 22.....	
Classics 172A.....	W	Design 132A.....		English 43 ..	W	French 22S.....	
Classics 172B.....	W	Design 132B.....		English 44 ..	W	French 23.....	
Classics 173.....		Design 134A.....		English 45 ..	W	French 23S.....	
Classics 174.....		Design 134B.....		English 105 ..	W	French 50 ..	W
Classics 175D.....	W	Design 135A.....		English 106 ..	W	French 51D.....	W
Classics 190.....	W	Design 135B.....		English 107 ..	W	French 52D.....	W
Communication 5 †.....		Design 136A.....		English 110A ..	W	French 53 † .. D..W	
Comparative Literature 1 *		Design 136B.....		English 110B ..	W	French 100.....	
Comparative Literature 2 *		Design 137A.....		English 111 ..	W	French 101.....	
Comparative Literature 3 *		Design 137B.....		English 113A ..	W	French 102.....	
Comparative Literature 4D *		Design 138.....		English 113B ..	W	French 103.....	
Comparative Literature 5D ..W		Design 142AD.....		English 115 ..	W	French 107.....	
Comparative Literature 6D ..W		Design 142BD.....		English 117 ..	W	French 107A ..	W
Comparative Literature 7D ..W		Design 143.....		English 120 ..	W	French 107B ..	W
Comparative Literature 8 ..W		Design 144.....		English 122 ..	W	French 107S ..	W
Comparative Literature 9D ..W		Design 145.....		English 123 ..	W	French 115.....	
Comparative Literature 11D ..W		Design 150A ..		English 125D ..	W	French 116.....	
Comparative Literature 12D ..W		Design 150B ..		English 130 ..	W	French 117A ..	
Comparative Literature 13 ..W		Design 151.....		English 133 ..	W	French 117B ..	
Comparative Literature 14 ..W		Design 154.....		English 137 ..	W	French 118A ..	
Comparative Literature 20 ..W		Design 157.....		English 138 ..	W	French 118B ..	
Comparative Literature 24 ..W		Design 159.....		English 139D ..	W	French 119A ..	W
Comparative Literature 25D ..W		Design 160.....		English 140D ..	W	French 119B ..	W
Comparative Literature 53AD ..W		Design 161.....		English 142 ..	W	French 119C ..	
Comparative Literature 53BD ..W		Design 170.....		English 143 ..	W	French 120 ..	W
Comparative Literature 53CD ..W		Design 171.....		English 144 ..	W	French 121 ..	W
Comparative Literature 100D ..W		Design 177.....		English 146 ..	W	French 122 ..	
Comparative Literature 110D ..W		Design 179 ..		English 147 ..	W	French 124D ..	

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

French 125	W	Hindi/Urdu 22		History 166A †		Italian 3S
French 125S	W	Hindi/Urdu 23		History 166B †		Italian 9
French 127	W	History 3 †	D .. W	History 167 †	W	Italian 9S
French 128S		History 4A †	W	History 168 †		Italian 50
French 130	W	History 4B †	W	History 169A †	D .. W	W
French 133D		History 4C †	W	History 169B †	D .. W	Italian 101
French 140		History 6 †	D .. W	History 170A †	D .. W	Italian 101S
French 141		History 7A †	D .. W	History 170B †	D .. W	Italian 104
French 141S		History 7B †	D .. W	History 170C †		Italian 104S
French 160 †		History 7C †	D .. W	History 171A †	D .. W	Italian 105
French 161 †		History 8 †	D	History 171B †	D .. W	Italian 107 †
French 162 †		History 9A †	D .. W	History 171D †	W	Italian 107S †
German 1		History 9B †	D .. W	History 172 †	W	Italian 108 †
German 2		History 10A †	D .. W	History 173 †	D .. W	W
German 3		History 10B †	W	History 174A †	W	Italian 112
German 6		History 10C †	W	History 174B †	W	Italian 113
German 10D	W	History 11		History 174C †	W	Italian 114
German 11D	W	History 12 †	D .. W	History 174D †		Italian 115A
German 20		History 15 †	D .. W	History 175 †	W	Italian 115B
German 21		History 17A †	D .. W	History 176A †		Italian 115C
German 22		History 17B †	D .. W	History 176B †		Italian 115D
German 40D	W	History 72A †	D .. W	History 177A †	D .. W	Italian 118
German 45		History 72B †	D .. W	History 177B †	D .. W	Italian 119
German 48	W	History 80 †		History 178A †	D .. W	Italian 120A
German 101A		History 85 †		History 178B †	D .. W	Italian 120B
German 101B		History 102S †	W	History 179 †	D .. W	Italian 121D
German 103		History 105 †		History 180AN †	W	Italian 121SD
German 104		History 108 †		History 180BN †	W	Italian 128
German 105	W	History 109A †		History 181 †	W	Italian 131
German 112	W	History 110 †	D .. W	History 182 †		Italian 139B
German 113D	W	History 110A		History 183A †	D .. W	Italian 140
German 114	W	History 111A †	W	History 183B †	D .. W	Italian 141D
German 115	W	History 111B †	W	History 184 †	D .. W	Italian 142
German 116D	W	History 111C †	W	History 185A †	W	Italian 145
German 117D	W	History 112A †	D .. W	History 185B †	W	Italian 145S
German 118A	W	History 112B †	D .. W	History 189 †	W	Italian 150D
German 118B	W	History 113 †	D .. W	History 190A †	D .. W	Italian 190X
German 118C	W	History 115A †	D .. W	History 190B †	D .. W	Japanese 1
German 118E	W	History 115B †	D .. W	History 190C †	D .. W	Japanese 1A
German 119	W	History 115C †	D .. W	History 190D †	D .. W	Japanese 1AS
German 120		History 115D †	D .. W	History 191A †	D .. W	Japanese 2
German 121		History 115E †	D .. W	History 191B †	D .. W	Japanese 3
German 122		History 115F †	D .. W	History 191C †	D .. W	Japanese 4
German 123		History 116 †		History 191D †	D .. W	Japanese 5
German 124		History 121A †	W	History 191E †	D .. W	Japanese 6
German 125		History 121B †	W	History 191F †	D .. W	Japanese 7S
German 126		History 121C †	W	History 191J		Japanese 10D
German 127		History 122 †		History 193A †	D .. W	Japanese 15S
German 129D		History 125 †	W	History 193B †	D .. W	Japanese 25 †
German 131		History 130A †	D .. W	History 193C †		D .. W
German 132		History 130B †		History 193D †	D .. W	Japanese 31
German 133		History 130C †		History 194A †	D .. W	Japanese 50D
German 134		History 131A †		History 194B †	D	Japanese 101D
German 141	W	History 131B †	W	History 194C †	D	Japanese 102D
German 142	W	History 131C †	W	History 194D †		Japanese 103D
German 143		History 132 †	D .. W	History 194E †		Japanese 104D
German 144		History 133 †		History 195B †	D .. W	Japanese 105D
German 160		History 134A †		History 196A †	D .. W	Japanese 106D
German 168D		History 135A †		History 196B †	D .. W	Japanese 107D
German 176A	W	History 135B †		Human Rights 1 †		Japanese 108D
German 185		History 136 †	W	Human Rights 120A †		Japanese 109D
Greek 1		History 138A †	W	Human Rights 130 †	W	Japanese 111
Greek 2		History 138B †	W	Human Rights 131 †	D .. W	Japanese 112
Greek 2NT		History 138C †	W	Human Rights 134 †	D .. W	Japanese 113
Greek 3		History 139A †	W	Human Rights 136 †		Japanese 117S
Greek 3NT		History 139B †	W	Human Rights 138		Japanese 121
Greek 100		History 140 †		Human Rights 161 †		Japanese 122
Greek 101		History 141 †	W	Humanities 1 (course 1D required		Japanese 123
Greek 102		History 142A †	D .. W	concurrently) #		Japanese 130
Greek 103A		History 142B †	D .. W	Humanities 1D (course 1 required		Japanese 131
Greek 103B		History 143 †	D .. W	concurrently) .....W		Japanese 132
Greek 104		History 144A †		Humanities 2A		Japanese 133
Greek 105		History 144B †	D .. W	Humanities 2B		Japanese 134
Greek 110		History 145 †	W	Humanities 3 †	W	Japanese 135
Greek 111		History 146A †	W	Humanities 4 (course 4D required		Japanese 136
Greek 112		History 146B †	W	concurrently) #		Japanese 151D
Greek 113		History 147A †	W	Humanities 4D (course 4 required		Japanese 152D
Greek 114		History 147B †	W	concurrently) .....W		Japanese 156D
Greek 115		History 147C †	D .. W	Humanities 7D	W	Japanese 157
Greek 116		History 148A †	D .. W	Humanities 8 †	D .. W	Japanese 158
Greek 121		History 148B †	D .. W	Humanities 9 (course 9D required		Japanese 194H
Greek 130		History 148C †	D .. W	concurrently) #		Jewish Studies 101D
Hebrew 1		History 149 †	D .. W	Humanities 9D (course 9 required		Jewish Studies 110D
Hebrew 1A		History 151A †	W	concurrently) .....W		Jewish Studies 111D
Hebrew 2		History 151B †	W	Humanities 13D	W	Jewish Studies 112D
Hebrew 3		History 151C †	W	Humanities 15 †	D .. W	Jewish Studies 116D
Hebrew 10		History 151D †	D .. W	Humanities 60 †	D .. W	Jewish Studies 120D
Hebrew 100AN		History 159 †	D .. W	Humanities 144	W	Landscape Architecture 1
Hebrew 100BN		History 160 †	D .. W	Humanities 180	W	Landscape Architecture 21
Hebrew 100CN		History 161 †		Integrated Studies 8B	W	Landscape Architecture 30
Hindi/Urdu 1		History 162 †	D .. W	Italian 1		Landscape Architecture 60 †
Hindi/Urdu 1A		History 163A †		Italian 1S		Landscape Architecture 70
Hindi/Urdu 2		History 163B †		Italian 2		Landscape Architecture 102
Hindi/Urdu 3		History 164 †		Italian 2S		Landscape Architecture 140 †
Hindi/Urdu 21		History 165 †		Italian 3		Landscape Architecture 141 †
						Landscape Architecture 142 †

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Landscape Architecture 160 †	Music 113	Philosophy 172	Religious Studies 175AD .....
Landscape Architecture 170	Music 114	Philosophy 174	Russian 1
Landscape Architecture 171	Music 115.....W	Philosophy 175	Russian 2
Landscape Architecture 180 †	Music 116	Philosophy 178	Russian 3
Latin 1	Music 121	Philosophy 189A	Russian 4
Latin 2	Music 122	Philosophy 189B	Russian 5
Latin 3	Music 123	Philosophy 189D	Russian 6
Latin 100	Music 124A.....W	Philosophy 189E	Russian 101A
Latin 101.....W	Music 124B.....W	Philosophy 189F	Russian 101B
Latin 102.....W	Music 126D.....W	Philosophy 189G	Russian 101C
Latin 103.....W	Music 127	Philosophy 189H	Russian 102
Latin 104.....W	Music 129AD.....W	Philosophy 189I †	Russian 105
Latin 105.....W	Music 129BD.....W	Philosophy 189J	Russian 122 .....
Latin 106.....W	Music 129CD.....W	Philosophy 189K	W
Latin 108.....W	Music 129DD.....W	Political Science 4 † .....	W
Latin 109.....W	Music 150	Political Science 51 †	W
Latin 110.....W	Music 194HA	Political Science 112 † .....	W
Latin 112.....W	Music 194HB	Political Science 113 † .....	W
Latin 115.....W	Music 195	Political Science 114 † .....	W
Latin 116.....W	Native American Studies 5D *	Political Science 115 † .....	W
Latin 118	Native American Studies 7 † .....D.. W	Political Science 116 † .....	W
Latin 119	Native American Studies 10 † .....D.. W	Political Science 118A † .....	W
Latin 120	Native American Studies 12 †	Political Science 118B † .....	W
Latin 121	Native American Studies 33D	Political Science 118C † .....	W
Latin 125.....W	Native American Studies 34	Political Science 119 † .....	W
Latin 130	Native American Studies 101D	Portuguese 100	
Linguistics 1 † .....	Native American Studies 108 †	Portuguese 132	
Linguistics 1Y † .....	Native American Studies 115 † .....D	Portuguese 141D .....	W
Linguistics 5 †	Native American Studies 125 †	Portuguese 159	
Linguistics 15 †	Native American Studies 133A † ....D	Portuguese 161	
Linguistics 103A	Native American Studies 133B † ....D.. W	Portuguese 162	
Linguistics 103B	Native American Studies 135 †	Portuguese 163	
Linguistics 106	Native American Studies 157D	Religious Studies 1D .....	W
Linguistics 111	Native American Studies 180 †	Religious Studies 1AD .....	W
Linguistics 121	Native American Studies 181AD .....	Religious Studies 1BD .....	W
Linguistics 127 †	Native American Studies 181BD .....	Religious Studies 1CD .....	W
Linguistics 131	Native American Studies 181CD .....	Religious Studies 1DD .....	W
Linguistics 141.....W	Native American Studies 184 †	Religious Studies 1E † .....D.. W	
Linguistics 150 † .....	Native American Studies 185	Religious Studies 1FD .....	W
Linguistics 151	Native American Studies 188D .....	Religious Studies 1GD .....	W
Linguistics 152.....W	Native American Studies 191 † .....D	Religious Studies 1IH	
Linguistics 182 † .....	Persian 1D	Religious Studies 1J	
Medieval Studies 20A.....W	Philosophy 1 .....	Religious Studies 10 .....	W
Medieval Studies 20B.....W	Philosophy 7	Religious Studies 10AD .....	W
Medieval Studies 130A.....W	Philosophy 7YD	Religious Studies 11D .....	W
Medieval Studies 130B.....W	Philosophy 11D.....W	Religious Studies 12D .....	W
Middle East/S. Asian Std 100 † .....	Philosophy 12	Religious Studies 15YD .....	W
Middle East/S. Asian Std 111A † .....	Philosophy 13G †	Religious Studies 21D .....	W
Middle East/S. Asian Std 121AD .....	Philosophy 14D.....W	Religious Studies 23D .....	W
Middle East/S. Asian Std 121CD .....	Philosophy 15 .....	Religious Studies 30D .....	W
Middle East/S. Asian Std 122A	Philosophy 16	Religious Studies 40 .....	W
Middle East/S. Asian Std 131AD .....	Philosophy 21 .....	Religious Studies 42D .....	W
Middle East/S. Asian Std 150 †	Philosophy 22 .....	Religious Studies 45	
Middle East/S. Asian Std 151A	Philosophy 24 .....	Religious Studies 60 † .....D.. W	
Middle East/S. Asian Std 180 † .....	Philosophy 30 † .....	Religious Studies 65CD .....	W
Middle East/S. Asian Std 181A †	Philosophy 31 † .....	Religious Studies 67 † .....D.. W	
Middle East/S. Asian Std 181B †	Philosophy 32 † .....	Religious Studies 68D .....	W
Middle East/S. Asian Std 181C † .....	Philosophy 38 † .....	Religious Studies 69D .....	W
Music 3A	Philosophy 101 .....	Religious Studies 70D .....	W
Music 3B	Philosophy 102 .....	Religious Studies 80D .....	W
Music 6A	Philosophy 103 .....	Religious Studies 100 † .....	W
Music 6B	Philosophy 105 .....	Religious Studies 102D .....	W
Music 6C	Philosophy 107 † .....	Religious Studies 103D .....	W
Music 7A	Philosophy 108 † .....	Religious Studies 104D .....	W
Music 7B	Philosophy 109 † .....	Religious Studies 105D .....	W
Music 7C	Philosophy 111	Religious Studies 106D .....	W
Music 10.....W	Philosophy 112	Religious Studies 110	
Music 11D	Philosophy 113	Religious Studies 111	
Music 16A	Philosophy 114 .....	Religious Studies 115D .....	W
Music 16B	Philosophy 115 .....	Religious Studies 120D .....	W
Music 16C	Philosophy 116	Religious Studies 122	
Music 17A	Philosophy 117	Religious Studies 125 .....	W
Music 17B	Philosophy 118 † .....	Religious Studies 131 † .....D.. W	
Music 17C	Philosophy 119 † .....	Religious Studies 132	
Music 24A.....W	Philosophy 120	Religious Studies 134 † .....D.. W	
Music 24B.....W	Philosophy 123 .....	Religious Studies 138	
Music 24C.....W	Philosophy 125 .....	Religious Studies 140	
Music 28D.....W	Philosophy 128	Religious Studies 141A .....	W
Music 101A	Philosophy 131	Religious Studies 141B .....	W
Music 101B	Philosophy 134	Religious Studies 141C .....	W
Music 102	Philosophy 135	Religious Studies 143D .....	W
Music 103	Philosophy 137A	Religious Studies 144D .....	W
Music 105D.....W	Philosophy 137B	Religious Studies 145	
Music 106.....W	Philosophy 137C	Religious Studies 150D .....	W
Music 107A	Philosophy 141	Religious Studies 154 † .....	W
Music 107B	Philosophy 143	Religious Studies 156D .....	W
Music 108A	Philosophy 145	Religious Studies 157D .....	W
Music 108B	Philosophy 151	Religious Studies 158D .....	W
Music 110A.....W	Philosophy 156	Religious Studies 160 † .....D.. W	
Music 110B.....W	Philosophy 157	Religious Studies 161D .....	W
Music 110C.....W	Philosophy 160	Religious Studies 161B † .....D.. W	
Music 110D.....W	Philosophy 161	Religious Studies 162 † .....D.. W	
Music 110E.....W	Philosophy 162	Religious Studies 163 † .....D.. W	
Music 110F.....W	Philosophy 168	Religious Studies 165D .....	W
Music 110G.....W	Philosophy 170	Religious Studies 170	W
* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.			
† Also assigned to another area of topical breadth.			
# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).			

Spanish 170SD	Women's Studies 190 †	Atmospheric Science 6	Engineering 45Y
Spanish 171	Women's Studies 191 † ..... W	Atmospheric Science 10..... W	Engineering 100
Spanish 171S	Women's Studies 193 †	Atmospheric Science 60	Engineering 102
Spanish 172D	Women's Studies 194HA †	Atmospheric Science 110	Engineering 103
Spanish 173D	Women's Studies 194HB †	Atmospheric Science 111	Engineering 104
Spanish 174D	Women's Studies 195 † ..... D .. W	Atmospheric Science 111Y	Engineering 104L
Spanish 175D		Atmospheric Science 115	Engineering 105
Spanish 176D		Atmospheric Science 116	Engineering 106 †
Spanish 178A †		Atmospheric Science 120	Engineering 111
Spanish 179 †		Atmospheric Science 121A	Engineering 121
Spanish 179Y †		Atmospheric Science 121B	Engineering 122
Spanish 180		Atmospheric Science 124	Engineering 160 †
Spanish 181		Atmospheric Science 128	Engineering 180
Spanish 182		Atmospheric Science 133	Engr: Aerospace Sci 10 †
Technocultural Studies 1		Atmospheric Science 149	Engr: Aerospace Sci 126
Technocultural Studies 5 †		Atmospheric Science 158	Engr: Aerospace Sci 127
Technocultural Studies 150	Animal Biology 102	Atmospheric Science 160	Engr: Aerospace Sci 129
Technocultural Studies 155	Animal Genetics 101	Avian Sciences 11..... W	Engr: Aerospace Sci 130A
Technocultural Studies 158	Animal Genetics 105	Avian Sciences 13..... W	Engr: Aerospace Sci 130B
Technocultural Studies 160 †	Animal Genetics 107	Avian Sciences 14L	Engr: Aerospace Sci 133
Textiles & Clothing 7 † ..... D .. W	Animal Genetics 111	Avian Sciences 15L	Engr: Aerospace Sci 135
University Writing Program 1 *	Animal Science 1 ..... W	Avian Sciences 16LA	Engr: Aerospace Sci 137
University Writing Program 1V ..... W	Animal Science 2 ..... W	Avian Sciences 16LB	Engr: Aerospace Sci 138
University Writing Program 1Y ..... W	Animal Science 12	Avian Sciences 16LC	Engr: Aerospace Sci 140
University Writing Program 10	Animal Science 15	Avian Sciences 100	Engr: Aerospace Sci 141
University Writing Program 11	Animal Science 18	Avian Sciences 103	Engr: Aerospace Sci 142
University Writing Program 12	Animal Science 21	Avian Sciences 115	Engr: Aerospace Sci 189C
University Writing Program 18 *	Animal Science 41	Avian Sciences 121	Engr: Biological Systems 1
University Writing Program 19 *	Animal Science 42 ..... W	Avian Sciences 123	Engr: Biological Systems 75
University Writing Program 101 *	Animal Science 100	Avian Sciences 149	Engr: Biological Systems 103
University Writing Program 102A *	Animal Science 103	Avian Sciences 150	Engr: Biological Systems 114
University Writing Program 102B *	Animal Science 104	Avian Sciences 160	Engr: Biological Systems 115
University Writing Program 102C *	Animal Science 106 ..... W	Avian Sciences 170	Engr: Biological Systems 120
University Writing Program 102D *	Animal Science 112 †	Biological Sciences 2A	Engr: Biological Systems 125
University Writing Program 102E *	Animal Science 115	Biological Sciences 2B	Engr: Biological Systems 127
University Writing Program 102F *	Animal Science 118	Biological Sciences 2C	Engr: Biological Systems 128
University Writing Program 102G *	Animal Science 119	Biological Sciences 10 ..... W	Engr: Biological Systems 130
University Writing Program 102H ..... W	Animal Science 120	Biological Sciences 101	Engr: Biological Systems 133
University Writing Program 102I ..... W	Animal Science 120L	Biological Sciences 102	Engr: Biological Systems 144
University Writing Program 102J ..... W	Animal Science 123	Biological Sciences 102Q	Engr: Biological Systems 145
University Writing Program 102K ..... W	Animal Science 124 ..... W	Biological Sciences 103	Engr: Biological Systems 147
University Writing Program 102L ..... W	Animal Science 125	Biological Sciences 104	Engr: Biological Systems 161
University Writing Program 102M	Animal Science 126	Biological Sciences 105	Engr: Biological Systems 165
University Writing Program 104A *	Animal Science 127	Biological Sciences 122	Engr: Biological Systems 170A
University Writing Program 104B *	Animal Science 128	Biological Sciences 122P	Engr: Biological Systems 170B
University Writing Program 104C *	Animal Science 129	Biological Sciences 124	Engr: Biological Systems 170BL
University Writing Program 104D *	Animal Science 131	Biological Sciences 132 ..... W	Engr: Biological Systems 170C
University Writing Program 104E *	Animal Science 136 ..... W	Biological Sciences 133	Engr: Biological Systems 170CL
University Writing Program 104F *	Animal Science 137	Biological Sciences 134	Engr: Biological Systems 175
University Writing Program 104FY	Animal Science 139	Biological Sciences 180L	Engr: Biological Systems 189A
University Writing Program 104I ..... W	Animal Science 140	Biological Sciences 181	Engr: Biological Systems 189B
University Writing Program 104J	Animal Science 142	Biological Sciences 183	Engr: Biological Systems 189C
University Writing Program 104T	Animal Science 143	Biotechnology 1Y	Engr: Biological Systems 189D
University Writing Program 106	Animal Science 144	Biotechnology 150	Engr: Biological Systems 189E
University Writing Program 110 ..... W	Animal Science 145	Biotechnology 160	Engr: Biological Systems 189F
University Writing Program 111A ..... W	Animal Science 146 ..... W	Biotechnology 161A	Engr: Biological Systems 189G
University Writing Program 111B ..... W	Animal Science 147	Biotechnology 161B	Engr: Biomedical 1
University Writing Program 111C ..... W	Animal Science 149	Biotechnology 171	Engr: Biomedical 20
University Writing Program 112A ..... W	Animal Science 194HA	Biotechnology 188 ..... W	Engr: Biomedical 89A
University Writing Program 120 †	Animal Science 194IB	Biotechnology 194H	Engr: Biomedical 89B
University Writing Program 121 †	Animal Science 194HC	Chemistry 2A	Engr: Biomedical 89C
Women's Studies 20 † ..... D .. W	Anthropology 1D ..... W	Chemistry 2AH	Engr: Biomedical 102
Women's Studies 25D ..... W	Anthropology 3 † ..... D	Chemistry 2B	Engr: Biomedical 105
Women's Studies 50 † ..... D .. W	Anthropology 5 ..... W	Chemistry 2BH	Engr: Biomedical 106
Women's Studies 60 † ..... D .. W	Anthropology 12 ..... W	Chemistry 2C	Engr: Biomedical 107
Women's Studies 70 † ..... D	Anthropology 13 † ..... W	Chemistry 2CH	Engr: Biomedical 108
Women's Studies 102 † ..... D .. W	Anthropology 15D ..... W	Chemistry 3A	Engr: Biomedical 109
Women's Studies 103 †	Anthropology 34D ..... W	Chemistry 8A	Engr: Biomedical 110A
Women's Studies 104 †	Anthropology 54	Chemistry 8B	Engr: Biomedical 110B
Women's Studies 130 † ..... D	Anthropology 156A	Chemistry 10 ..... W	Engr: Biomedical 110L
Women's Studies 136 † ..... D .. W	Anthropology 156B	Chemistry 105	Engr: Biomedical 111
Women's Studies 137 † ..... D .. W	Anthropology 157 #	Chemistry 107B	Engr: Biomedical 116 ..... W
Women's Studies 138 † ..... D .. W	Anthropology 158D ..... W	Chemistry 110A	Engr: Biomedical 117
Women's Studies 139 † ..... D .. W	Anthropology 159	Chemistry 115 ..... W	Engr: Biomedical 118
Women's Studies 145 † ..... D	Anthropology 160	Chemistry 118A	Engr: Biomedical 126
Women's Studies 146 †	Anthropology 180	Chemistry 118B	Engr: Biomedical 140
Women's Studies 148 † ..... D	Anthropology 181	Chemistry 118C	Engr: Biomedical 141
Women's Studies 158 † ..... D	Anthropology 182	Chemistry 124A	Engr: Biomedical 142
Women's Studies 160D ..... W	Anthropology 183 ..... W	Chemistry 125 ..... W	Engr: Biomedical 143
Women's Studies 162D	Applied Biological System Tech 49	Chemistry 131	Engr: Biomedical 151
Women's Studies 164D	Applied Biological System Tech 101	Chemistry 145	Engr: Biomedical 152
Women's Studies 165 † ..... D	Applied Biological System Tech 110L	Chemistry 150 ..... W	Engr: Biomedical 161A
Women's Studies 170 † ..... D .. W	Applied Biological System Tech 121	Chicano Studies 40D ..... W	Engr: Biomedical 161L
Women's Studies 175 † ..... D .. W	Applied Biological System Tech 142	Chicano Studies 40SD ..... W	Engr: Biomedical 1615
Women's Studies 178AD ..... W	Applied Biological System Tech 150	Chicano Studies 140A	Engr: Biomedical 162
Women's Studies 178BD ..... W	Applied Biological System Tech 161	Cinema & Technocultural Stud 12 †	Engr: Biomedical 163
Women's Studies 178CD ..... W	Applied Biological System Tech 163	Engineering 2 †	Engr: Biomedical 167
Women's Studies 178DD ..... W	Applied Biological System Tech 165	Engineering 4	Engr: Biomedical 173
Women's Studies 178ED ..... W	Applied Biological System Tech 181N	Engineering 6	Engr: Biomedical 189A
Women's Studies 178FD ..... W	Applied Biological System Tech 182	Engineering 7	Engr: Biomedical 189B
Women's Studies 179D ..... W	Astronomy 10G	Engineering 10 † ..... W	Engr: Biomedical 189C
Women's Studies 180D	Astronomy 10L	Engineering 17	Engr: Chemical 51
Women's Studies 182 † ..... D .. W	Astronomy 10S	Engineering 20	Engr: Chemical 80 †
Women's Studies 185 †	Astronomy 25	Engineering 35	Engr: Chemical 140
Women's Studies 189 †	Atmospheric Science 5	Engineering 45 ..... W	Engr: Chemical 141

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Engr: Chemical 142	Engr: Civil & Environ 189D	Engr: Elect & Compu 134B	Entomology 2 ..... W
Engr: Chemical 143	Engr: Civil & Environ 189E	Engr: Elect & Compu 135	Entomology 10
Engr: Chemical 144	Engr: Civil & Environ 189F	Engr: Elect & Compu 136A	Entomology 100 ..... W
Engr: Chemical 145A	Engr: Civil & Environ 189G	Engr: Elect & Compu 136B	Entomology 101
Engr: Chemical 145B	Engr: Civil & Environ 189H	Engr: Elect & Compu 140A	Entomology 102
Engr: Chemical 148A	Engr: Civil & Environ 189I	Engr: Elect & Compu 140B	Entomology 103 ..... W
Engr: Chemical 148B	Engr: Civil & Environ 189J	Engr: Elect & Compu 145	Entomology 104
Engr: Chemical 152A	Engr: Computer Science 10	Engr: Elect & Compu 146A	Entomology 105
Engr: Chemical 152B	Engr: Computer Science 12 †	Engr: Elect & Compu 146B	Entomology 107 ..... W
Engr: Chemical 155	Engr: Computer Science 15 ..... W	Engr: Elect & Compu 150A	Entomology 109 ..... W
Engr: Chemical 155A.....W	Engr: Computer Science 20	Engr: Elect & Compu 150B	Entomology 110 ..... W
Engr: Chemical 155B.....W	Engr: Computer Science 30	Engr: Elect & Compu 152	Entomology 116
Engr: Chemical 157	Engr: Computer Science 40	Engr: Elect & Compu 157A	Entomology 117 ..... W
Engr: Chemical 158A †	Engr: Computer Science 50	Engr: Elect & Compu 157B	Entomology 119 ..... W
Engr: Chemical 158B	Engr: Computer Science 60	Engr: Elect & Compu 160	Entomology 153 ..... W
Engr: Chemical 158C	Engr: Computer Science 89A	Engr: Elect & Compu 161	Entomology 156 #
Engr: Chemical 160	Engr: Computer Science 89B	Engr: Elect & Compu 165	Entomology 156L (course 156 required
Engr: Chemical 161A	Engr: Computer Science 89C	Engr: Elect & Compu 170	concurrently) ..... W
Engr: Chemical 161B	Engr: Computer Science 89D	Engr: Elect & Compu 171	Entomology 158 † ..... W
Engr: Chemical 161C †	Engr: Computer Science 89E	Engr: Elect & Compu 172	Entomology 180A
Engr: Chemical 161L	Engr: Computer Science 89F	Engr: Elect & Compu 173A	Entomology 180B
Engr: Chemical 166	Engr: Computer Science 89G	Engr: Elect & Compu 173B	Environmental Horticulture 1
Engr: Chemical 170	Engr: Computer Science 89H	Engr: Elect & Compu 180A	Environmental Horticulture 6
Engr: Chemical-Materials 1	Engr: Computer Science 89I	Engr: Elect & Compu 180B	Environmental Horticulture 100
Engr: Chemical-Materials 5	Engr: Computer Science 89J	Engr: Elect & Compu 181A	Environmental Horticulture 101
Engr: Chemical-Materials 6	Engr: Computer Science 89K	Engr: Elect & Compu 181B	Environmental Horticulture 102
Engr: Chemical-Materials 189A	Engr: Computer Science 89L	Engr: Elect & Compu 183	Environmental Horticulture 105
Engr: Chemical-Materials 189B	Engr: Computer Science 120	Engr: Elect & Compu 189A	Environmental Horticulture 120
Engr: Chemical-Materials 189C	Engr: Computer Science 122A	Engr: Elect & Compu 189B	Environmental Horticulture 125
Engr: Chemical-Materials 189D	Engr: Computer Science 122B	Engr: Elect & Compu 189C	Environmental Horticulture 133
Engr: Chemical-Materials 189E	Engr: Computer Science 124	Engr: Elect & Compu 189D	Environmental Horticulture 150
Engr: Chemical-Materials 189F	Engr: Computer Science 127	Engr: Elect & Compu 189E	Environmental Horticulture 160
Engr: Chemical-Materials 189G	Engr: Computer Science 129	Engr: Elect & Compu 189F	Environmental Horticulture 160L
Engr: Chemical-Materials 189H	Engr: Computer Science 130	Engr: Elect & Compu 189G	Environmental Sci & Management 8 .... W
Engr: Chemical-Materials 189I	Engr: Computer Science 132	Engr: Elect & Compu 189H	Environmental Sci & Management 30
Engr: Chemical-Materials 189J	Engr: Computer Science 140A	Engr: Elect & Compu 189I	Environmental Sci & Management 47
Engr: Chemical-Materials 189K	Engr: Computer Science 140B	Engr: Elect & Compu 189J	Environmental Sci & Management 100
Engr: Chemical-Materials 189L	Engr: Computer Science 142	Engr: Elect & Compu 189K	Environmental Sci & Management 108
Engr: Chemical-Materials 189M	Engr: Computer Science 145	Engr: Elect & Compu 189L	Environmental Sci & Management 121
Engr: Chemical-Materials 189N	Engr: Computer Science 150	Engr: Elect & Compu 189M	Environmental Sci & Management 131 . W
Engr: Chemical-Materials 189O	Engr: Computer Science 152A	Engr: Elect & Compu 189N	Environmental Sci & Management 141
Engr: Chemical-Materials 189P	Engr: Computer Science 152B	Engr: Elect & Compu 189O	Environmental Sci & Management 144
Engr: Chemical-Materials 189Q	Engr: Computer Science 152C	Engr: Elect & Compu 189P	Environmental Sci & Management 186
Engr: Chemical-Materials 189R	Engr: Computer Science 153	Engr: Elect & Compu 189Q	Environmental Sci & Management 194H
Engr: Chemical-Materials 194HA	Engr: Computer Science 154A	Engr: Elect & Compu 189R	Environmental Sci & Management 195 †
Engr: Chemical-Materials 194HB	Engr: Computer Science 154B	Engr: Elect & Compu 189S	Environ Science & Policy 1 †
Engr: Chemical-Materials 194HC	Engr: Computer Science 158	Engr: Elect & Compu 189T	Environ Science & Policy 10 † #
Engr: Civil & Environ 3 †	Engr: Computer Science 160	Engr: Elect & Compu 189U	Environ Science & Policy 10 #
Engr: Civil & Environ 16	Engr: Computer Science 163	Engr: Elect & Compu 189V	Environ Science & Policy 30 #
Engr: Civil & Environ 17	Engr: Computer Science 165A	Engr: Elect & Compu 190C	Environ Science & Policy 100
Engr: Civil & Environ 19	Engr: Computer Science 165B	Engr: Elect & Compu 193A	Environ Science & Policy 110
Engr: Civil & Environ 90X	Engr: Computer Science 170	Engr: Elect & Compu 193B	Environ Science & Policy 111
Engr: Civil & Environ 114	Engr: Computer Science 171	Engr: Elect & Compu 195A	Environ Science & Policy 116N
Engr: Civil & Environ 115	Engr: Computer Science 173	Engr: Elect & Compu 195B	Environ Science & Policy 121 ..... W
Engr: Civil & Environ 119	Engr: Computer Science 174	Engr: Elect & Compu 196	Environ Science & Policy 123
Engr: Civil & Environ 123 † .....D...W	Engr: Computer Science 175	Engr: Materials Science 2	Environ Science & Policy 124
Engr: Civil & Environ 125	Engr: Computer Science 177	Engr: Materials Science 147	Environ Science & Policy 127
Engr: Civil & Environ 126	Engr: Computer Science 178	Engr: Materials Science 160	Environ Science & Policy 150A
Engr: Civil & Environ 127	Engr: Computer Science 189A	Engr: Materials Science 162	Environ Science & Policy 150B
Engr: Civil & Environ 128	Engr: Computer Science 189B	Engr: Materials Science 162L ..... W	Environ Science & Policy 150C
Engr: Civil & Environ 130	Engr: Computer Science 189C	Engr: Materials Science 164	Environ Science & Policy 151
Engr: Civil & Environ 131	Engr: Computer Science 189D	Engr: Materials Science 170	Environ Science & Policy 151L
Engr: Civil & Environ 132	Engr: Computer Science 189E	Engr: Materials Science 172	Environ Science & Policy 152
Engr: Civil & Environ 135	Engr: Computer Science 189F	Engr: Materials Science 172L ..... W	Environ Science & Policy 155
Engr: Civil & Environ 136	Engr: Computer Science 189G	Engr: Materials Science 174 ..... W	Environ Science & Policy 155L
Engr: Civil & Environ 137 †	Engr: Computer Science 189H	Engr: Materials Science 174L ..... W	Environ Science & Policy 163 † ..... W
Engr: Civil & Environ 138	Engr: Computer Science 189I	Engr: Materials Science 180 ..... W	Environ Science & Policy 170 †
Engr: Civil & Environ 139	Engr: Computer Science 189J	Engr: Materials Science 181 ..... W	Environ Science & Policy 191A
Engr: Civil & Environ 140	Engr: Computer Science 189K	Engr: Materials Science 182 ..... W	Environ Science & Policy 191B
Engr: Civil & Environ 140L	Engr: Computer Science 189L	Engr: Materials Science 188A	Environmental Toxicology 10
Engr: Civil & Environ 141	Engr: Computer Science 193A	Engr: Materials Science 188B	Environmental Toxicology 20 ..... W
Engr: Civil & Environ 141L	Engr: Computer Science 193B	Engr: Mechanical 5	Environmental Toxicology 30
Engr: Civil & Environ 142	Engr: Elect & Compu 10	Engr: Mechanical 50	Environmental Toxicology 101
Engr: Civil & Environ 143	Engr: Elect & Compu 70	Engr: Mechanical 106	Environmental Toxicology 102A
Engr: Civil & Environ 144	Engr: Elect & Compu 89A	Engr: Mechanical 108	Environmental Toxicology 102B
Engr: Civil & Environ 145	Engr: Elect & Compu 89B	Engr: Mechanical 109	Environmental Toxicology 103A
Engr: Civil & Environ 146.....W	Engr: Elect & Compu 89C	Engr: Mechanical 115	Environmental Toxicology 103B
Engr: Civil & Environ 148A	Engr: Elect & Compu 89D	Engr: Mechanical 121	Environmental Toxicology 104
Engr: Civil & Environ 148B	Engr: Elect & Compu 89E	Engr: Mechanical 134	Environmental Toxicology 110 ..... W
Engr: Civil & Environ 149	Engr: Elect & Compu 89F	Engr: Mechanical 139	Environmental Toxicology 111
Engr: Civil & Environ 150	Engr: Elect & Compu 100	Engr: Mechanical 150A	Environmental Toxicology 120
Engr: Civil & Environ 153	Engr: Elect & Compu 110A	Engr: Mechanical 150B	Environmental Toxicology 127
Engr: Civil & Environ 155 † .....W	Engr: Elect & Compu 110B	Engr: Mechanical 151	Environmental Toxicology 128
Engr: Civil & Environ 161	Engr: Elect & Compu 112	Engr: Mechanical 152	Environmental Toxicology 130
Engr: Civil & Environ 162	Engr: Elect & Compu 116	Engr: Mechanical 154	Environmental Toxicology 131
Engr: Civil & Environ 163 † .....W	Engr: Elect & Compu 118	Engr: Mechanical 161	Environmental Toxicology 135
Engr: Civil & Environ 165 † .....W	Engr: Elect & Compu 119A	Engr: Mechanical 163	Environmental Toxicology 138
Engr: Civil & Environ 171	Engr: Elect & Compu 119B	Engr: Mechanical 164	Environmental Toxicology 146
Engr: Civil & Environ 171L	Engr: Elect & Compu 130A	Engr: Mechanical 165	Environmental Toxicology 194HA
Engr: Civil & Environ 173	Engr: Elect & Compu 130B	Engr: Mechanical 171	Evolution and Ecology 2 ..... W
Engr: Civil & Environ 175	Engr: Elect & Compu 132A	Engr: Mechanical 172	Evolution and Ecology 10
Engr: Civil & Environ 179	Engr: Elect & Compu 132B	Engr: Mechanical 185A	Evolution and Ecology 11
Engr: Civil & Environ 189A	Engr: Elect & Compu 132C	Engr: Mechanical 185B	Evolution and Ecology 12
Engr: Civil & Environ 189B	Engr: Elect & Compu 133	Engr: Mechanical 189B	Evolution and Ecology 13
Engr: Civil & Environ 189C	Engr: Elect & Compu 134A	Entomology 1 †	Evolution and Ecology 100

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Evolution and Ecology 101	Geology 28	Mathematics 16C	Neuro, Physio & Behavior 10
Evolution and Ecology 102	Geology 30	Mathematics 17A	Neuro, Physio & Behavior 12 #
Evolution and Ecology 103	Geology 32	Mathematics 17B	Neuro, Physio & Behavior 14
Evolution and Ecology 104	Geology 35	Mathematics 17C	Neuro, Physio & Behavior 15
Evolution and Ecology 105	Geology 36.....W	Mathematics 21A	Neuro, Physio & Behavior 15V
Evolution and Ecology 106	Geology 50	Mathematics 21AH	Neuro, Physio & Behavior 17
Evolution and Ecology 107	Geology 50L	Mathematics 21AL	Neuro, Physio & Behavior 68
Evolution and Ecology 108	Geology 60	Mathematics 21B	Neuro, Physio & Behavior 100L
Evolution and Ecology 110	Geology 62	Mathematics 21BH	Neuro, Physio & Behavior 101
Evolution and Ecology 111	Geology 101	Mathematics 21C	Neuro, Physio & Behavior 110A
Evolution and Ecology 114	Geology 101L	Mathematics 21CH	Neuro, Physio & Behavior 110B
Evolution and Ecology 115	Geology 103	Mathematics 21D	Neuro, Physio & Behavior 132
Evolution and Ecology 119	Geology 105.....W	Mathematics 21M	Neuro, Physio & Behavior 139
Evolution and Ecology 138 ..W	Geology 106.....W	Mathematics 22A	Neuro, Physio & Behavior 142
Evolution and Ecology 141 ..W	Geology 107	Mathematics 22B	Neuro, Physio & Behavior 159
Evolution and Ecology 147	Geology 107L	Mathematics 25	Neuro, Physio & Behavior 161
Evolution and Ecology 149	Geology 108.....W	Mathematics 36	Neuro, Physio & Behavior 167
Evolution and Ecology 150	Geology 109 (course 109L required	Mathematics 67	Nutrition 10
Evolution and Ecology 161	concurrently) #	Mathematics 108.....W	Nutrition 11 ..W
Evolution and Ecology 180A	Geology 109L (course 109 required	Mathematics 111	Nutrition 104
Evolution and Ecology 180B	concurrently) ..W	Mathematics 114	Nutrition 105
Evolution and Ecology 181	Geology 110.....W	Mathematics 115A	Nutrition 111AY
Evolution and Ecology 194HA	Geology 115 † ..W	Mathematics 115B	Nutrition 112
Evolution and Ecology 194HB	Geology 116N	Mathematics 116	Nutrition 113
Evolution and Ecology 194HC	Geology 120	Mathematics 118A	Nutrition 114 ..W
Exercise Biology 10D	Geology 130	Mathematics 118B	Nutrition 115 ..W
Exercise Biology 90X	Geology 131	Mathematics 118C	Nutrition 116A
Exercise Biology 101	Geology 134.....W	Mathematics 119A	Nutrition 116AL
Exercise Biology 103	Geology 136	Mathematics 119B	Nutrition 116B
Exercise Biology 104L ..W	Geology 138	Mathematics 124	Nutrition 116BL
Exercise Biology 106	Geology 139	Mathematics 125A	Nutrition 117 ..W
Exercise Biology 106L	Geology 141	Mathematics 125B	Nutrition 118
Exercise Biology 110	Geology 141L	Mathematics 128A	Nutrition 120AN † ..D
Exercise Biology 111	Geology 142	Mathematics 128B	Nutrition 120BN † ..D
Exercise Biology 112	Geology 143.....W	Mathematics 128C	Nutrition 122
Exercise Biology 115	Geology 144	Mathematics 129	Nutrition 123
Exercise Biology 116	Geology 145.....W	Mathematics 133	Nutrition 124
Exercise Biology 117	Geology 146	Mathematics 135A	Nutrition 127
Exercise Biology 124	Geology 147	Mathematics 135B	Nutrition 129
Exercise Biology 125	Geology 148	Mathematics 141	Nutrition 130
Exercise Biology 126	Geology 149	Mathematics 145	Nutrition 190
Exercise Biology 179	Geology 150A	Mathematics 146	Philosophy 10
Fiber And Polymer Science 100	Geology 150B	Mathematics 147	Philosophy 13 †
Fiber And Polymer Science 110 † ..W	Geology 150C	Mathematics 148	Philosophy 13G †
Fiber And Polymer Science 150	Geology 152	Mathematics 150A	Philosophy 30 † ..W
Fiber And Polymer Science 161	Geology 156	Mathematics 150B	Philosophy 31 †
Fiber And Polymer Science 161L	Geology 160	Mathematics 150C	Philosophy 32 † ..W
Fiber And Polymer Science 180A	Geology 161	Mathematics 160	Philosophy 38 † ..W
Fiber And Polymer Science 180B	Geology 162	Mathematics 165	Philosophy 107 † ..W
Food Science & Technology 1	Geology 163	Mathematics 167	Philosophy 108 † ..W
Food Science & Technology 3	Geology 182	Mathematics 168	Philosophy 189I †
Food Science & Technology 10 †	Geology 194A	Mathematics 180	Physics 1A
Food Science & Technology 50	Geology 194B	Mathematics 185A	Physics 1B
Food Science & Technology 100A	Geology 194HA	Mathematics 185B	Physics 7A
Food Science & Technology 100B	Geology 194HB	Mathematics 189.....W	Physics 7B
Food Science & Technology 101A	Geology 198	Med: Cell Bio & Human Anat 101	Physics 7C
Food Science & Technology 101B	Global Disease Biology 101	Med: Cell Bio & Human Anat 101L	Physics 9A
Food Science & Technology 102A	Global Disease Biology 102	Med - Public Health Sciences 101 †	Physics 9B
Food Science & Technology 102B	Global Disease Biology 103	Microbiology 10	Physics 9C
Food Science & Technology 103	History 109B † ..D	Microbiology 101	Physics 9D
Food Science & Technology 104	Human Development 117.....W	Microbiology 102	Physics 9HA
Food Science & Technology 104L	Hydrologic Science 10 † ..W	Microbiology 104L	Physics 9HB
Food Science & Technology 107	Hydrologic Science 47	Microbiology 105	Physics 9HC
Food Science & Technology 109	Hydrologic Science 103N	Microbiology 105L	Physics 9HD
Food Science & Technology 110	Hydrologic Science 110	Microbiology 111	Physics 9HE
Food Science & Technology 110L	Hydrologic Science 124	Microbiology 115	Physics 10 ..W
Food Science & Technology 117	Hydrologic Science 134	Microbiology 120	Physics 10C
Food Science & Technology 119	Hydrologic Science 141	Microbiology 140	Physics 12
Food Science & Technology 123	Hydrologic Science 142	Microbiology 150	Physics 30
Food Science & Technology 123L	Hydrologic Science 143	Microbiology 162	Physics 49
Food Science & Technology 127	Hydrologic Science 144	Microbiology 170	Microbiology
Food Science & Technology 128	Hydrologic Science 146	Molecular and Cellular Biology 10	Physics 90X
Food Science & Technology 131	Hydrologic Science 147	Molecular and Cellular Biology 110Y	Physics 102
Food Science & Technology 151Y	Hydrologic Science 151	Molecular and Cellular Biology 120L	Physics 104B
Food Science & Technology 160	Hydrologic Science 182	Molecular and Cellular Biology 121	Physics 105A
Food Science & Technology 190	Integrated Studies 8A.....W	Molecular and Cellular Biology 123	Physics 105B
Geology 1	International Agricultural Dev 142	Molecular and Cellular Biology 124	Physics 105C
Geology 2 #	International Agricultural Dev 160	Molecular and Cellular Biology 126	Physics 108
Geology 2G (course 2 required	Landscape Architecture 1 † ..W	Molecular and Cellular Biology 139	Physics 108L
concurrently) ..W	Landscape Architecture 50	Molecular and Cellular Biology 140L	Physics 110A
Geology 3 #	Landscape Architecture 60 †	Molecular and Cellular Biology 142	Physics 110B
Geology 3G (course 3 required	Landscape Architecture 140 †	Molecular and Cellular Biology 143	Physics 110C
concurrently) ..W	Landscape Architecture 142 †	Molecular and Cellular Biology 144	Physics 112
Geology 3L	Landscape Architecture 150	Molecular and Cellular Biology 145	Physics 115A
Geology 4	Landscape Architecture 160 †	Molecular and Cellular Biology 150	Physics 115B
Geology 10	Landscape Architecture 180 †	Molecular and Cellular Biology 160L	Physics 116A
Geology 12	Landscape Architecture 180F	Molecular and Cellular Biology 162	Physics 116B
Geology 16	Landscape Architecture 181F	Molecular and Cellular Biology 163	Physics 116C
Geology 16G.....W	Linguistics 112	Molecular and Cellular Biology 164	Physics 122A
Geology 17	Linguistics 175	Molecular and Cellular Biology 182	Physics 122B
Geology 18	Linguistics 177 †	Molecular and Cellular Biology 194	Physics 123
Geology 18V	Math & Physical Sci 1	Native American Studies 123 † .....D ..W	Physics 129A
Geology 20	Mathematics 12	Nematology 10V ..W	Physics 129B
Geology 25	Mathematics 16A	Nematology 100	Physics 130A
Geology 25V	Mathematics 16B	Nematology 110	Physics 130B
			Physics 140A

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Physics 140B	Science and Society 40 † .....D.. W
Physics 150	Science and Society 42 †
Physics 151	Science and Society 70A †
Physics 152	Science and Society 110
Physics 153	Science and Society 120 † .....W
Physics 154	Science and Society 135S † .....D.. W
Physics 155	Soil Science 10
Physics 156	Soil Science 100
Physics 157	Soil Science 102
Physics 160 †	Soil Science 105
Physics 185	Soil Science 107
Physics 194HA	Soil Science 109
Physics 194HB	Soil Science 111
Physics 195	Soil Science 118
Plant Biology 10	Soil Science 120
Plant Biology 102	Spanish 179 †
Plant Biology 105	Spanish 179Y †
Plant Biology 108	Statistics 10 † .....W
Plant Biology 112	Statistics 12
Plant Biology 116	Statistics 13
Plant Biology 119	Statistics 13Y
Plant Biology 126	Statistics 32
Plant Biology 143 † .....D.. W	Statistics 100
Plant Pathology 140 .....W	Statistics 101
Plant Pathology 148	Statistics 103
Plant Science 1	Statistics 104
Plant Science 2	Statistics 106
Plant Science 12 † .....D.. W	Statistics 108
Plant Science 14 .....W	Statistics 130A
Plant Science 15	Statistics 130B
Plant Science 21	Statistics 131A
Plant Science 100A	Statistics 131B
Plant Science 100AL	Statistics 131C
Plant Science 100B	Statistics 135
Plant Science 100BL	Statistics 137
Plant Science 100C	Statistics 138
Plant Science 100CL	Statistics 141
Plant Science 101	Statistics 144
Plant Science 102	Statistics 145
Plant Science 105	Statistics 194HA
Plant Science 112	Statistics 194HB
Plant Science 113	Statistics 200A
Plant Science 114	Statistics 200B
Plant Science 116	Statistics 200C
Plant Science 120	Technocultural Studies 5 †
Plant Science 130 .....W	Textiles & Clothing 6
Plant Science 131	Textiles & Clothing 162
Plant Science 141 † .....W	Textiles & Clothing 162L
Plant Science 144	Textiles & Clothing 163
Plant Science 147	Textiles & Clothing 163L
Plant Science 147L	Textiles & Clothing 164
Plant Science 150	Textiles & Clothing 165
Plant Science 152	Textiles & Clothing 171
Plant Science 153	University Writing Program 120 †
Plant Science 154	University Writing Program 121 †
Plant Science 157	VM Pathology: Microbiol & Immun 129Y †
Plant Science 158	Viticulture & Enology 2
Plant Science 160	Viticulture & Enology 3 † #
Plant Science 162	Viticulture & Enology 101A
Plant Science 170A	Viticulture & Enology 101B
Plant Science 170B	Viticulture & Enology 101C
Plant Science 171	Viticulture & Enology 110
Plant Science 172	Viticulture & Enology 111
Plant Science 173	Viticulture & Enology 115
Plant Science 174	Viticulture & Enology 118
Plant Science 176	Viticulture & Enology 123
Plant Science 178	Viticulture & Enology 123L .....W
Plant Science 188 .....W	Viticulture & Enology 124
Plant Science 193	Viticulture & Enology 124L
Political Science 51 †	Viticulture & Enology 125
Political Science 114 † .....W	Viticulture & Enology 125L
Science & Tech Studies 1 †	Viticulture & Enology 126
Science & Tech Studies 20 † .....W	Viticulture & Enology 126L
Science & Tech Studies 130A † .....W	Viticulture & Enology 128
Science & Tech Studies 130B .....W	Viticulture & Enology 128L
Science & Tech Studies 131 † .....W	Viticulture & Enology 135
Science & Tech Studies 161 .....W	Viticulture & Enology 140
Science and Society 1 † .....D.. W	Wild, Fish & Conserv Biol 10D .....W
Science and Society 2 † .....W	Wild, Fish & Conserv Biol 11 .....W
Science and Society 3 † .....W	Wild, Fish & Conserv Biol 50 .....W
Science and Society 4 † .....W	Wild, Fish & Conserv Biol 51 .....W
Science and Society 5 † .....W	Wild, Fish & Conserv Biol 100
Science and Society 7 † .....D.. W	Wild, Fish & Conserv Biol 101 .....W
Science and Society 8 † .....W	Wild, Fish & Conserv Biol 102L .....W
Science and Society 9 † .....W	Wild, Fish & Conserv Biol 111
Science and Society 10 † .....W	Wild, Fish & Conserv Biol 121 .....W
Science and Society 11 † .....W	Wild, Fish & Conserv Biol 130
Science and Society 12 † .....D.. W	Wild, Fish & Conserv Biol 141
Science and Society 13 † .....W	Wild, Fish & Conserv Biol 153 .....W
Science and Society 15 † .....D.. W	Wild, Fish & Conserv Biol 154
Science and Society 18 † .....W	Wild, Fish & Conserv Biol 155 .....W
Science and Society 20 † .....W	Wild, Fish & Conserv Biol 156 .....W
Science and Society 25 † .....D.. W	Wild, Fish & Conserv Biol 157
Science and Society 25V †	Wild, Fish & Conserv Biol 195
Science and Society 30 † .....W	

**Social Sciences****(SocSci)**

Afr Am & Afr Std 10D	Anthropology 13 † .....W
Afr Am & Afr Std 12 † .....W	Anthropology 20 † .....D
Afr Am & Afr Std 17D .....W	Anthropology 23D .....W
Afr Am & Afr Std 18 †	Anthropology 24D .....W
Afr Am & Afr Std 80D .....W	Anthropology 25 .....W
Afr Am & Afr Std 107C † .....D.. W	Anthropology 28
Afr Am & Afr Std 107D .....D.. W	Anthropology 30 †
Afr Am & Afr Std 110D	Anthropology 32D .....W
Afr Am & Afr Std 111 † .....D.. W	Anthropology 50D .....W
Afr Am & Afr Std 130	Anthropology 100
Afr Am & Afr Std 133D	Anthropology 101D .....W
Afr Am & Afr Std 145AD	Anthropology 103
Afr Am & Afr Std 145BD	Anthropology 104ND
Afr Am & Afr Std 165D	Anthropology 105 .....W
Afr Am & Afr Std 172D .....W	Anthropology 109 .....W
Afr Am & Afr Std 176 †	Anthropology 110D .....W
Afr Am & Afr Std 177 †	Anthropology 117D .....W
Afr Am & Afr Std 178 †	Anthropology 120D .....W
Afr Am & Afr Std 180 † .....D	Anthropology 121D .....W
Agricul & Res Econ 1	Anthropology 122AD .....W
Agricul & Res Econ 1S	Anthropology 122BD .....W
Agricul & Res Econ 15D .....W	Anthropology 123AN
Agricul & Res Econ 18	Anthropology 124D .....W
Agricul & Res Econ 100A	Anthropology 125AD .....W
Agricul & Res Econ 100B	Anthropology 125BD .....W
Agricul & Res Econ 106	Anthropology 126AD .....W
Agricul & Res Econ 107	Anthropology 126BD .....W
Agricul & Res Econ 112	Anthropology 127D .....W
Agricul & Res Econ 113	Anthropology 128AD .....W
Agricul & Res Econ 115AD	Anthropology 128BD .....W
Agricul & Res Econ 115B	Anthropology 129D .....W
Agricul & Res Econ 119	Anthropology 130A .....W
Agricul & Res Econ 120	Anthropology 130BN .....W
Agricul & Res Econ 120S	Anthropology 131D
Agricul & Res Econ 121	Anthropology 132D .....W
Agricul & Res Econ 130	Anthropology 134 † .....D.. W
Agricul & Res Econ 132	Anthropology 136 .....W
Agricul & Res Econ 133	Anthropology 138
Agricul & Res Econ 139	Anthropology 139AND .....W
Agricul & Res Econ 140	Anthropology 139BND .....W
Agricul & Res Econ 142	Anthropology 140AD .....W
Agricul & Res Econ 143	Anthropology 140BD .....W
Agricul & Res Econ 144	Anthropology 141BD .....W
Agricul & Res Econ 145	Anthropology 142D .....W
Agricul & Res Econ 146	Anthropology 143AD .....W
Agricul & Res Econ 147	Anthropology 144D .....W
Agricul & Res Econ 147M	Anthropology 145 † .....D.. W
Agricul & Res Econ 150D .....W	Anthropology 146ND .....W
Agricul & Res Econ 155	Anthropology 148AD .....W
Agricul & Res Econ 156	Anthropology 149AD .....W
Agricul & Res Econ 157	Anthropology 149BD .....W
Agricul & Res Econ 165	Anthropology 170D .....W
Agricul & Res Econ 171A	Anthropology 172D .....W
Agricul & Res Econ 171B	Anthropology 173D .....W
Agricul & Res Econ 175	Anthropology 174
Agricul & Res Econ 176	Anthropology 175
Agricul & Res Econ 190	Anthropology 176D .....W
Agricul & Res Econ 194HA	Anthropology 177
Agricul & Res Econ 194HB	Anthropology 178D .....W
Agricultural Education 160 .....W	Anthropology 179
Agricultural Education 172 .....W	Anthropology 184
American Studies 1B † .....D.. W	Anthropology 185
American Studies 1C † .....D.. W	Anthropology 186A †
American Studies 1E † .....D.. W	Arabic 101A † .....D.. W
American Studies 5 † .....W	Art History 120A †
American Studies 10 † .....D.. W	Art History 154 †
American Studies 125 † .....D.. W	Asian American Studies 1 † .....D.. W
American Studies 127 .....D.. W	Asian American Studies 2 † .....D.. W
American Studies 18 .....D.. W	Asian American Studies 3D
American Studies 100 † .....D.. W	Asian American Studies 100 † .....D.. W
American Studies 102D	Asian American Studies 102D
American Studies 112 † .....D.. W	Asian American Studies 112 † .....D.. W
American Studies 113 † .....D.. W	Asian American Studies 113 † .....D.. W
American Studies 114D	Asian American Studies 114D
American Studies 115D	Asian American Studies 115D
American Studies 116 † .....D.. W	Asian American Studies 116 † .....D.. W
American Studies 131D	Asian American Studies 131D
American Studies 132	Asian American Studies 132
American Studies 141 † .....D.. W	Asian American Studies 141 † .....D.. W
American Studies 150	Asian American Studies 150
American Studies 150B † .....D.. W	Asian American Studies 150B † .....D.. W
American Studies 152 † .....D.. W	Asian American Studies 152C † .....D.. W
American Studies 153 † .....D.. W	Asian American Studies 150D † .....D.. W
American Studies 154 † .....D.. W	Asian American Studies 150E † .....D.. W
American Studies 155 † .....D.. W	Asian American Studies 150F † .....D.. W
American Studies 156 † .....D.. W	Asian American Studies 155
American Studies 157 † .....D.. W	Asian American Studies 189A
Animal Science 112 †	Asian American Studies 189B †
Animal Science 141 .....W	Asian American Studies 189C
Animal Science 148 .....W	Asian American Studies 189D
Animal Science 170 .....W	Asian American Studies 189E
Anthropology 2D .....W	Asian American Studies 189F
Anthropology 3 † .....D	Asian American Studies 189G
Anthropology 4D .....W	Asian American Studies 189H

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Asian American Studies 189I †	Dramatic Art 144B † .....	D	History 9A † .....	D ..W	History 171B † .....	D..W
Chicano Studies 10 † ..... D .. W	Economics 1A		History 9B † .....	D ..W	History 171D † .....	....W
Chicano Studies 23 †	Economics 1B		History 10A † .....	D ..W	History 172 † .....	....W
Chicano Studies 30D	Economics 110A		History 10B † .....	....W	History 173 † .....	D..W
Chicano Studies 100	Economics 110B		History 10C † .....	....W	History 174A † .....	....W
Chicano Studies 110D ..... W	Economics 111A		History 12 † .....	D ..W	History 174B † .....	....W
Chicano Studies 111 †	Economics 111B		History 15 † .....	D ..W	History 174C † .....	....W
Chicano Studies 112D ..... W	Economics 115AD		History 17A † .....	D ..W	History 174D † .....	
Chicano Studies 113	Economics 115B		History 17B † .....	D ..W	History 175 † .....	....W
Chicano Studies 114	Economics 121A		History 72A † .....	D ..W	History 176A † .....	
Chicano Studies 114S	Economics 162		History 72B † .....	D ..W	History 176B † .....	
Chicano Studies 120D	Education 100		History 80 † .....		History 177A † .....	D..W
Chicano Studies 121D ..... W	Education 110..... W		History 85 † .....		History 177B † .....	D..W
Chicano Studies 122	Education 115		History 102S † .....	....W	History 178A † .....	D..W
Chicano Studies 122S	Education 119..... W		History 105 † .....		History 178B † .....	D..W
Chicano Studies 123D ..... W	Education 120..... W		History 108 † .....		History 179 † .....	D..W
Chicano Studies 125S	Education 121		History 109A † .....		History 180AN † .....	....W
Chicano Studies 130D	Education 122D..... W		History 109B † .....	D	History 180BN † .....	....W
Chicano Studies 131D	Education 130		History 110 † .....	D ..W	History 181 † .....	....W
Chicano Studies 131SD	Education 142		History 111A † .....	....W	History 182 † .....	
Chicano Studies 150 † ..... D .. W	Education 150		History 111B † .....	....W	History 183A † .....	D..W
Chicano Studies 161 † ..... D .. W	Education 152 †		History 111C † .....	....W	History 183B † .....	D..W
Chicano Studies 181 † ..... D .. W	Education 173		History 112A † .....	D ..W	History 184 † .....	D..W
Chicano Studies 182 † ..... D .. W	Education 183		History 112B † .....	D ..W	History 185A † .....	....W
Chicano Studies 184	Education 185		History 112C		History 185B † .....	....W
Chicano Studies 184S	Education 245		History 113 † .....	D ..W	History 188	
Chinese 7 † ..... D	Engineering 2 †		History 115A † .....	D ..W	History 189 † .....	....W
Chinese 134 †	Engineering 10 † .....	W	History 115B † .....	D ..W	History 190A † .....	D..W
Cinema & Technocultural Stud 40A †	Engineering 106 †		History 115C † .....	D ..W	History 190B † .....	D..W
Cinema & Technocultural Stud 40B †	Engineering 160 †		History 115D † .....	D ..W	History 190C † .....	D..W
Cinema & Technocultural Stud 150 †	Engineering 188		History 115E † .....	D ..W	History 190D † .....	D..W
Cinema & Technocultural Stud 162 †	Engineering 190		History 115F † .....	D ..W	History 191A † .....	D..W
Cinema & Technocultural Stud 172 †	Engr: Aerospace Sci 10 †		History 116 † .....		History 191B † .....	D..W
Communication 3	Engr: Chemical 80 †		History 120		History 191C † .....	D..W
Communication 5 †	Engr: Chemical 158A †		History 121A † .....	....W	History 191D † .....	D..W
Communication 10Y	Engr: Chemical 161C †		History 121B † .....	....W	History 191E † .....	D..W
Communication 76	Engr: Civil & Environ 3 †		History 121C † .....	....W	History 191F † .....	D..W
Communication 101	Engr: Civil & Environ 123 † ..... D .. W		History 122 † .....		History 193A † .....	D..W
Communication 102	Engr: Civil & Environ 137 †		History 125 † .....	....W	History 193B † .....	D..W
Communication 110	Engr: Civil & Environ 155 † .....	W	History 130A † .....	D ..W	History 193C † .....	
Communication 111	Engr: Civil & Environ 163 † .....	W	History 130B † .....		History 193D † .....	D..W
Communication 112	Engr: Civil & Environ 165 † .....	W	History 130C † .....		History 194A † .....	D..W
Communication 114	Engr: Civil & Environ 190		History 131A † .....		History 194B † .....	D
Communication 120	Engr: Computer Science 188..... W		History 131B † .....	....W	History 194C † .....	D
Communication 121	English 172 †		History 131C † .....	....W	History 194D † .....	
Communication 122	Entomology 1 †		History 132 † .....	D ..W	History 194E † .....	
Communication 123	Entomology 158 † .....	W	History 133 † .....		History 195B † .....	....W
Communication 130	Environmental Sci & Management 8 .... W		History 134A † .....		History 196A † .....	D..W
Communication 131	Environmental Sci & Management 195 †		History 135A † .....		History 196B † .....	D..W
Communication 136	Environ Sciences & Policy 1 †		History 135B † .....		Human Development 12D	
Communication 139	Environ Sciences & Policy 10 † #		History 136 † .....	....W	Human Development 102	....W
Communication 140	Environ Science & Policy 101D .....	W	History 138A † .....	....W	Human Development 103D	
Communication 141	Environ Science & Policy 105 .....	W	History 138B † .....	....W	Human Development 120..... W	
Communication 142	Environ Science & Policy 160		History 138C † .....	....W	Human Development 161..... W	
Communication 143..... W	Environ Science & Policy 161..... W		History 139A † .....	....W	Human Rights 1 † .....	
Communication 144	Environ Science & Policy 162		History 139B † .....	....W	Human Rights 120A † .....	
Communication 145	Environ Science & Policy 163 † .....	W	History 140 † .....		Human Rights 130 † .....	....W
Communication 146	Environ Science & Policy 164		History 141 † .....	....W	Human Rights 131 † .....	D..W
Communication 148	Environ Science & Policy 166N		History 142A † .....	D ..W	Human Rights 134 † .....	D..W
Communication 161	Environ Science & Policy 167		History 142B † .....	D ..W	Human Rights 136 † .....	
Communication 165	Environ Science & Policy 168A		History 143 † .....	D ..W	Human Rights 161 † .....	
Communication 170	Environ Science & Policy 168B		History 144A † .....		Humanities 3 † .....	....W
Communication 170V	Environ Science & Policy 169		History 144B † .....	D ..W	Humanities 8 † .....	D..W
Communication 172	Environ Science & Policy 170 †		History 145 † .....	....W	Humanities 15 † .....	D..W
Communication 174	Environ Science & Policy 171		History 146A † .....	....W	Humanities 60 † .....	D..W
Communication 180	Environ Science & Policy 172		History 146B † .....	....W	Hydrologic Science 10 † .....	....W
Communication 189A ..... W	Environ Science & Policy 173		History 147A † .....	....W	Hydrologic Science 150	
Communication 189B .....	Environ Science & Policy 175		History 147B † .....	....W	Integrated Studies 8C..... W	
Communication 189C .....	Environ Science & Policy 178		History 147C † .....	D ..W	International Agricultural Dev 10D .....	....W
Communication 189D .....	Environ Science & Policy 179		History 148A † .....	D ..W	International Agricultural Dev 103D	
Communication 194H	Environ Science & Policy 179L		History 148B † .....	D ..W	International Relations 1	
Comm & Reg Developmnt 1D .....	Exercise Biology 102		History 148C † .....	D ..W	International Relations 104	
Comm & Reg Developmnt 2D .....	Exercise Biology 120D		History 149 † .....	D ..W	International Relations 194HA	
Comm & Reg Developmnt 20 .....	Fiber And Polymer Science 110 † .....	W	History 151A † .....	....W	International Relations 194HB	
Comm & Reg Developmnt 118	Film Studies 121S .....		History 151B † .....	....W	Italian 107 † .....	
Comm & Reg Developmnt 140	Food Science & Technology 10 †		History 151C † .....	....W	Italian 107S † .....	
Comm & Reg Developmnt 141	Food Science & Technology 55 † .....	D .. W	History 151D † .....	D ..W	Italian 108 † .....	D..W
Comm & Reg Developmnt 142	Food Science & Technology 159 †		History 159 † .....	D ..W	Italian 108S † .....	D..W
Comm & Reg Developmnt 147D .....	French 53 † .....	D .. W	History 160 † .....	D ..W	Japanese 25 † .....	D..W
Comm & Reg Developmnt 149D .....	French 109		History 161 † .....		Jewish Studies 10D .....	....W
Comm & Reg Developmnt 151D .....	French 160 †		History 162 † .....	D ..W	Jewish Studies 121 .....	....W
Comm & Reg Developmnt 152 .....	French 161 †		History 163A † .....		Landscape Architecture 1 .....	....W
Comm & Reg Developmnt 153AD	French 162 †		History 163B † .....		Landscape Architecture 2 .....	....W
Comm & Reg Developmnt 153BD	Geology 81		History 164 † .....		Landscape Architecture 3 .....	....W
Comm & Reg Developmnt 153CD	Geology 115 † .....	W	History 165 † .....		Landscape Architecture 141 † .....	
Comm & Reg Developmnt 154D .....	Geology 183		History 166A † .....		Landscape Architecture 142 † .....	
Comm & Reg Developmnt 156	History 3 † .....	D .. W	History 166B † .....		Landscape Architecture 180 † .....	
Comm & Reg Developmnt 157D .....	History 4A † .....	W	History 167 † .....	....W	Landscape Architecture 180G	
Comm & Reg Developmnt 164	History 4B † .....	W	History 168 † .....		Landscape Architecture 180J	
Comm & Reg Developmnt 176D .....	History 4C † .....	W	History 169A † .....	D ..W	Landscape Architecture 180K	
Comm & Reg Developmnt 180	History 6 † .....	D .. W	History 169B † .....	D ..W	Linguistics 1 † .....	....W
Consumer Sciences 100D .....	History 7A † .....	D .. W	History 170A † .....	D ..W	Linguistics 1Y † .....	....W
Dramatic Art 114 † .....	History 7B † .....	D .. W	History 170B † .....	D ..W	Linguistics 5 † .....	
Dramatic Art 144 † .....	History 7C † .....	D .. W	History 170C † .....	D ..W	Linguistics 6D .....	....W
Dramatic Art 144A † .....	History 8 † .....	D	History 171A † .....	D ..W	Linguistics 15 † .....	

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Linguistics 127 †		Political Science 3 .....	W	Psychology 185 .....	W	Sociology 144	
Linguistics 150 † .....	W	Political Science 4 † .....	W	Religious Studies 1E † .....	D.. W	Sociology 145AD .....	W
Linguistics 160D .....	W	Political Science 5 .....	W	Religious Studies 60 † .....	D.. W	Sociology 145BD .....	W
Linguistics 163D .....	W	Political Science 7 .....	W	Religious Studies 67 † .....	D.. W	Sociology 146D .....	W
Linguistics 165		Political Science 51 † .....		Religious Studies 100 † .....		Sociology 147	
Linguistics 166D .....	W	Political Science 100 .....	W	Religious Studies 131 † .....	D.. W	Sociology 148	
Linguistics 171		Political Science 102 .....	W	Religious Studies 134 † .....	D.. W	Sociology 149D .....	W
Linguistics 173		Political Science 104 .....	W	Religious Studies 154 † .....		Sociology 150	
Linguistics 177 † .....		Political Science 105 .....	W	Religious Studies 160 † .....	D.. W	Sociology 151	
Linguistics 180D .....	W	Political Science 106 .....	W	Religious Studies 161B † .....	D.. W	Sociology 152	
Linguistics 182 † .....	D.. W	Political Science 107 .....	W	Religious Studies 162 † .....	D.. W	Sociology 153	
Management 11A		Political Science 108 .....	W	Religious Studies 163 † .....	D.. W	Sociology 154	
Management 11B		Political Science 109 .....	W	Religious Studies 166 .....		Sociology 155	
Management 120		Political Science 110 .....	W	Science & Tech Studies 1 † .....		Sociology 156	
Management 140		Political Science 112 † .....	W	Science & Tech Studies 20 † .....	W	Sociology 157	
Management 150		Political Science 113 † .....	W	Science & Tech Studies 32D .....	W	Sociology 159	
Management 160		Political Science 114 † .....	W	Science & Tech Studies 40A † .....		Sociology 160	
Management 170		Political Science 115 † .....	W	Science & Tech Studies 40B † .....		Sociology 170	
Management 180		Political Science 116 † .....	W	Science & Tech Studies 108 .....	W	Sociology 171	
Management Work Prof Bay Area 11A		Political Science 117 .....	W	Science & Tech Studies 109 .....	W	Sociology 172D .....	W
Management Work Prof Bay Area 11B		Political Science 118A † .....	W	Science & Tech Studies 121D .....	W	Sociology 173	
Management Work Prof Bay Area 120		Political Science 118B † .....	W	Science & Tech Studies 129D .....	W	Sociology 174	
Management Work Prof Bay Area 140		Political Science 118C † .....	W	Science & Tech Studies 150D .....	W	Sociology 175	
Management Work Prof Bay Area 150		Political Science 119 † .....	W	Science & Tech Studies 151 † .....		Sociology 176	
Management Work Prof Bay Area 160		Political Science 120 .....	W	Science & Tech Studies 160 † .....		Sociology 180A	
Management Work Prof Bay Area 170		Political Science 121 .....	W	Science & Tech Studies 162 † .....		Sociology 180B	
Management Work Prof Bay Area 180		Political Science 122 .....	W	Science & Tech Studies 163 .....		Sociology 181 .....	W
Management Working Professionl 11A		Political Science 123 .....	W	Science & Tech Studies 165 .....	W	Sociology 182	
Management Working Professionl 11B		Political Science 124D .....	W	Science & Tech Studies 172 † .....		Sociology 183	
Management Working Professionl 120		Political Science 126D .....	W	Science & Tech Studies 175 .....		Sociology 185	
Management Working Professionl 140		Political Science 129 .....	W	Science & Tech Studies 176 .....		Sociology 185Y	
Management Working Professionl 150		Political Science 130 .....	W	Science and Society 1 † .....	D.. W	Sociology 188	
Management Working Professionl 160		Political Science 131 .....	W	Science and Society 2 † .....	W	Sociology 189	
Management Working Professionl 170		Political Science 132 .....	W	Science and Society 3 † .....	W	Sociology 191	
Management Working Professionl 180		Political Science 135 .....	W	Science and Society 4 † .....	W	Sociology 193	
Med - Public Health Sciences 101 † .....		Political Science 136 .....	W	Science and Society 5 † .....	W	Sociology 194HB	
Med - Public Health Sciences 132		Political Science 137 .....	W	Science and Society 7 † .....	D.. W	Sociology 195	
Middle East/S. Asian Std 100 † .....	D.. W	Political Science 40A .....	W	Science and Society 7V .....	W	Spanish 111N	
Middle East/S. Asian Std 111A † .....	D.. W	Political Science 40BD .....	W	Science and Society 8 † .....	W	Spanish 112N	
Middle East/S. Asian Std 131C		Political Science 140C .....	W	Science and Society 9 † .....	W	Spanish 113	
Middle East/S. Asian Std 150 † .....		Political Science 142A .....	W	Science and Society 10 † .....	W	Spanish 114N	
Middle East/S. Asian Std 180 † .....	D.. W	Political Science 142B .....	W	Science and Society 11 † .....	W	Spanish 115 †	
Middle East/S. Asian Std 181A † .....		Political Science 143AD .....	W	Science and Society 12 † .....	D.. W	Spanish 115S †	
Middle East/S. Asian Std 181B † .....		Political Science 143BD .....	W	Science and Society 13 † .....	W	Spanish 116	
Middle East/S. Asian Std 181C † .....	D.. W	Political Science 144A .....	W	Science and Society 15 † .....	D.. W	Spanish 116S	
Native American Studies 1D .....		Political Science 144B .....	W	Science and Society 18 † .....	W	Spanish 118	
Native American Studies 7 † .....	D.. W	Political Science 146AD .....	W	Science and Society 20 † .....	W	Spanish 178A †	
Native American Studies 10 † .....	D.. W	Political Science 146BD .....	W	Science and Society 25 † .....	D.. W	Spanish 179 †	
Native American Studies 12 † .....		Political Science 147A .....	W	Science and Society 25V † .....		Spanish 179Y †	
Native American Studies 46D .....	W	Political Science 147B .....	W	Science and Society 30 † .....	W	Statistics 10 † .....	W
Native American Studies 108 † .....		Political Science 147C .....	W	Science and Society 40 † .....	D.. W	Technocultural Studies 160 † .....	
Native American Studies 110A		Political Science 147D .....	W	Science and Society 70A † .....		Textiles & Clothing 7 † .....	D.. W
Native American Studies 110B		Political Science 148A .....	W	Science and Society 120 † .....	W	Textiles & Clothing 8D .....	
Native American Studies 110C		Political Science 148BD .....	W	Science and Society 121 .....		Textiles & Clothing 107D .....	W
Native American Studies 110D		Political Science 148CD .....	W	Science and Society 135S † .....	D.. W	Textiles & Clothing 173 .....	
Native American Studies 115 † .....	D	Political Science 150 .....	W	Science and Society 140 .....	W	Textiles & Clothing 174D .....	
Native American Studies 116D		Political Science 151 .....	W	Sociology 1 .....		Textiles & Clothing 180A .....	
Native American Studies 117D		Political Science 152D .....	W	Sociology 2 .....	W	Textiles & Clothing 180B .....	
Native American Studies 118		Political Science 153 .....	W	Sociology 3 .....	W	VM Pathology, Microbiol & Immun 129Y † .....	
Native American Studies 119		Political Science 154 .....	W	Sociology 4D .....	W	Viticulture & Enology 3 † # .....	
Native American Studies 120D .....	W	Political Science 155 .....	W	Sociology 5D .....	W	Washington Center 175 .....	W
Native American Studies 121		Political Science 160 .....	W	Sociology 11 .....	W	Washington Center 193 .....	W
Native American Studies 122		Political Science 162 .....	W	Sociology 25 .....	W	Women's Studies 20 † .....	D.. W
Native American Studies 123 † .....	D.. W	Political Science 163 .....	W	Sociology 30AD .....		Women's Studies 50 † .....	D.. W
Native American Studies 125 † .....		Political Science 164 .....	W	Sociology 30BD .....		Women's Studies 60 † .....	D.. W
Native American Studies 130AD .....	W	Political Science 165 .....	W	Sociology 46A .....		Women's Studies 70 † .....	D
Native American Studies 130BD .....	W	Political Science 166D .....	W	Sociology 46B .....		Women's Studies 102 † .....	D.. W
Native American Studies 130CD .....	W	Political Science 168D .....	W	Sociology 90X .....		Women's Studies 103 † .....	
Native American Studies 133D		Political Science 170 .....	W	Sociology 100 .....		Women's Studies 104 † .....	
Native American Studies 133A † .....	D	Political Science 171 .....	W	Sociology 102 .....		Women's Studies 130 † .....	D
Native American Studies 133B † .....	D.. W	Political Science 172 .....	W	Sociology 103 .....		Women's Studies 136 † .....	D.. W
Native American Studies 134		Political Science 174 .....	W	Sociology 104 .....		Women's Studies 137 † .....	D.. W
Native American Studies 135 † .....		Political Science 175 .....	W	Sociology 106 .....		Women's Studies 138 † .....	D.. W
Native American Studies 146		Political Science 176D .....	W	Sociology 118 .....		Women's Studies 139 † .....	D.. W
Native American Studies 161		Political Science 179 .....	W	Sociology 120 .....		Women's Studies 140D .....	
Native American Studies 162		Political Science 180 .....	W	Sociology 122 .....		Women's Studies 145 † .....	D
Native American Studies 180 † .....		Political Science 183 .....	W	Sociology 123 .....		Women's Studies 146 † .....	
Native American Studies 184 † .....		Political Science 187 .....	W	Sociology 124 .....		Women's Studies 148 † .....	D
Native American Studies 191 † .....	D	Political Science 190 .....	W	Sociology 125 .....		Women's Studies 158 † .....	D
Nutrition 120AN † .....	D	Political Science 193 .....	W	Sociology 126 .....	W	Women's Studies 165 † .....	D
Nutrition 120BN † .....	D	Political Science 194HA .....		Sociology 128D .....	W	Women's Studies 170 † .....	D.. W
Philosophy 13 † .....		Political Science 194HB .....		Sociology 129D .....		Women's Studies 175 † .....	D.. W
Philosophy 17 .....	W	Political Science 195 .....		Sociology 130D .....		Women's Studies 182 † .....	D.. W
Philosophy 104		Political Science 196A .....		Sociology 131D .....		Women's Studies 184D .....	
Philosophy 109 † .....	W	Political Science 196B .....		Sociology 132D .....		Women's Studies 185 † .....	
Philosophy 118 † .....	D.. W	Political Science 196C .....		Sociology 133D .....		Women's Studies 187D .....	
Philosophy 119 † .....	D.. W	Political Science 196D .....		Sociology 134D .....		Women's Studies 189 † .....	
Physical Education 120D		Political Science 196E .....		Sociology 135D .....		Women's Studies 190 † .....	
Physics 160 † .....		Psychology 1 .....		Sociology 137 .....		Women's Studies 191 † .....	W
Plant Biology 143 † .....	D.. W	Psychology 142 .....	W	Sociology 138 .....		Women's Studies 193 † .....	
Plant Science 12 † .....	D.. W	Psychology 158D .....	W	Sociology 139 .....		Women's Studies 194HA † .....	
Plant Science 141 † .....	W	Psychology 162 .....	W	Sociology 140 .....		Women's Studies 194HB † .....	
Political Science 1 .....	W	Psychology 168 .....		Sociology 141 .....	W	Women's Studies 195 † .....	D.. W
Political Science 2 .....	W	Psychology 175 .....	W	Sociology 143A .....			
				Sociology 143B .....	W		

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

## SOCIAL-CULTURAL DIVERSITY (DIV)

These courses satisfy the GE requirement for social-cultural diversity. Many of these courses also provide GE credit for topical breadth or writing experience. Refer to the topical breadth and writing experience course lists to determine if any additional GE credit applies.

Afr Am & Afr Std 10	Anthropology 128B	Chicano Studies 160	Dramatic Art 156B
Afr Am & Afr Std 12	Anthropology 129	Chicano Studies 161	Dramatic Art 156C
Afr Am & Afr Std 15	Anthropology 131	Chicano Studies 181	Dramatic Art 156D
Afr Am & Afr Std 16	Anthropology 132	Chicano Studies 182	East Asian Studies 88
Afr Am & Afr Std 17	Anthropology 134	Chinese 7	East Asian Studies 113
Afr Am & Afr Std 50	Anthropology 139AN	Chinese 10	Economics 115A
Afr Am & Afr Std 52	Anthropology 139BN	Chinese 11	Education 122
Afr Am & Afr Std 80	Anthropology 140A	Chinese 50	Education 147
Afr Am & Afr Std 107A	Anthropology 140B	Chinese 100A	Engr: Civil & Environ 123
Afr Am & Afr Std 107B	Anthropology 141B	Chinese 101	English 125
Afr Am & Afr Std 107C	Anthropology 142	Chinese 102	English 139
Afr Am & Afr Std 107D	Anthropology 143A	Chinese 103	English 140
Afr Am & Afr Std 110	Anthropology 144	Chinese 104	English 141
Afr Am & Afr Std 111	Anthropology 145	Chinese 105	English 166
Afr Am & Afr Std 123	Anthropology 146N	Chinese 106	English 167
Afr Am & Afr Std 133	Anthropology 148A	Chinese 107	English 171A
Afr Am & Afr Std 145A	Anthropology 149A	Chinese 108	English 171B
Afr Am & Afr Std 145B	Anthropology 149B	Chinese 109A	English 178
Afr Am & Afr Std 150A	Anthropology 158	Chinese 109C	English 179
Afr Am & Afr Std 150B	Anthropology 170	Chinese 109D	English 181A
Afr Am & Afr Std 152	Anthropology 172	Chinese 109E	English 181B
Afr Am & Afr Std 153	Anthropology 173	Chinese 109G	English 182
Afr Am & Afr Std 156	Anthropology 176	Chinese 109H	English 185A
Afr Am & Afr Std 157	Anthropology 178	Chinese 109I	English 185B
Afr Am & Afr Std 160	Arabic 101A	Chinese 110	English 185C
Afr Am & Afr Std 162	Arabic 140	Chinese 150	English 186
Afr Am & Afr Std 163	Art History 1C	Cinema & Technocultural Stud 146A	Environ Science & Policy 101
Afr Am & Afr Std 165	Art History 1D	Cinema & Technocultural Stud 147A	Exercise Biology 10
Afr Am & Afr Std 168	Art History 1DY	Cinema & Technocultural Stud 148B	Exercise Biology 120
Afr Am & Afr Std 169	Art History 1E	Classics 171	Film Studies 120
Afr Am & Afr Std 170	Art History 150	Classics 175	Film Studies 121
Afr Am & Afr Std 171	Art History 151	Comm & Reg Devlpmnt 1	Film Studies 129
Afr Am & Afr Std 172	Art History 152	Comm & Reg Devlpmnt 2	Food Science & Technology 55
Afr Am & Afr Std 175A	Art History 155	Comm & Reg Devlpmnt 147	French 51
Afr Am & Afr Std 180	Art History 156	Comm & Reg Devlpmnt 149	French 52
Afr Am & Afr Std 182	Art History 163A	Comm & Reg Devlpmnt 151	French 53
Afr Am & Afr Std 185	Art History 163B	Comm & Reg Devlpmnt 153A	French 124
Agricult & Res Econ 15	Art History 163C	Comm & Reg Devlpmnt 153B	French 133
Agricult & Res Econ 115A	Art History 163D	Comm & Reg Devlpmnt 153C	German 10
Agricult & Res Econ 150	Art History 164	Comm & Reg Devlpmnt 154	German 11
American Studies 1A	Art History 175	Comm & Reg Devlpmnt 157	German 40
American Studies 1B	Art History 183B	Comm & Reg Devlpmnt 176	German 113
American Studies 1C	Art History 183C	Comparative Literature 4	German 116
American Studies 1E	Art History 185	Comparative Literature 5	German 117
American Studies 10	Art History 186	Comparative Literature 6	German 129
American Studies 21	Art History 187	Comparative Literature 7	German 168
American Studies 25	Art History 188A	Comparative Literature 9	History 3
American Studies 30	Art History 189	Comparative Literature 11	History 6
American Studies 55	Art Studio 30	Comparative Literature 12	History 7A
American Studies 59	Art Studio 149	Comparative Literature 25	History 7B
American Studies 110	Asian American Studies 1	Comparative Literature 53A	History 7C
American Studies 120	Asian American Studies 2	Comparative Literature 53B	History 8
American Studies 130	Asian American Studies 3	Comparative Literature 53C	History 9A
American Studies 139	Asian American Studies 4	Comparative Literature 100	History 9B
American Studies 151	Asian American Studies 100	Comparative Literature 110	History 10A
American Studies 152	Asian American Studies 102	Comparative Literature 135	History 12
American Studies 153	Asian American Studies 112	Comparative Literature 138	History 15
American Studies 154	Asian American Studies 114	Comparative Literature 145	History 17A
American Studies 155	Asian American Studies 115	Comparative Literature 147	History 17B
American Studies 156	Asian American Studies 116	Comparative Literature 148	History 72A
American Studies 157	Asian American Studies 130	Comparative Literature 151	History 72B
Anthropology 1	Asian American Studies 131	Comparative Literature 152	History 109B
Anthropology 2	Asian American Studies 141	Comparative Literature 152S	History 110
Anthropology 3	Asian American Studies 150B	Comparative Literature 153	History 112A
Anthropology 4	Asian American Studies 150C	Comparative Literature 154	History 112B
Anthropology 15	Asian American Studies 150D	Comparative Literature 155	History 113
Anthropology 20	Asian American Studies 150E	Comparative Literature 156	History 115A
Anthropology 23	Asian American Studies 150F	Comparative Literature 159	History 115B
Anthropology 24	Chicano Studies 10	Comparative Literature 165	History 115C
Anthropology 32	Chicano Studies 21	Comparative Literature 165S	History 115D
Anthropology 34	Chicano Studies 30	Comparative Literature 166	History 115E
Anthropology 50	Chicano Studies 40	Comparative Literature 172	History 115F
Anthropology 101	Chicano Studies 40S	Comparative Literature 175	History 130A
Anthropology 104N	Chicano Studies 50	Consumer Sciences 100	History 132
Anthropology 110	Chicano Studies 60	Design 142A	History 142A
Anthropology 117	Chicano Studies 65	Design 142B	History 142B
Anthropology 120	Chicano Studies 70	Dramatic Art 1	History 143
Anthropology 121	Chicano Studies 110	Dramatic Art 1S	History 144B
Anthropology 122A	Chicano Studies 112	Dramatic Art 5	History 147C
Anthropology 122B	Chicano Studies 120	Dramatic Art 11S	History 148A
Anthropology 124	Chicano Studies 121	Dramatic Art 114	History 148B
Anthropology 125A	Chicano Studies 123	Dramatic Art 144	History 148C
Anthropology 125B	Chicano Studies 130	Dramatic Art 144B	History 149
Anthropology 126A	Chicano Studies 131	Dramatic Art 150	History 151D
Anthropology 126B	Chicano Studies 131S	Dramatic Art 154	History 159
Anthropology 127	Chicano Studies 150	Dramatic Art 155	History 160
Anthropology 128A	Chicano Studies 154	Dramatic Art 156AN	History 162

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

History 169A	Jewish Studies 112	Political Science 166	Sociology 5
History 169B	Jewish Studies 116	Political Science 168	Sociology 30A
History 170A	Jewish Studies 120	Political Science 176	Sociology 30B
History 170B	Linguistics 6	Portuguese 141	Sociology 128
History 171A	Linguistics 160	Psychology 158	Sociology 129
History 171B	Linguistics 163	Psychology 170	Sociology 130
History 173	Linguistics 166	Religious Studies 1	Sociology 131
History 177A	Linguistics 180	Religious Studies 1A	Sociology 132
History 177B	Linguistics 182	Religious Studies 1B	Sociology 133
History 178A	Middle East/S. Asian Std 100	Religious Studies 1C	Sociology 134
History 178B	Middle East/S. Asian Std 111A	Religious Studies 1D	Sociology 135
History 179	Middle East/S. Asian Std 121A	Religious Studies 1E	Sociology 145A
History 183A	Middle East/S. Asian Std 121C	Religious Studies 1F	Sociology 145B
History 183B	Middle East/S. Asian Std 131A	Religious Studies 1G	Sociology 146
History 184	Middle East/S. Asian Std 180	Religious Studies 10A	Sociology 149
History 190A	Middle East/S. Asian Std 181C	Religious Studies 11	Sociology 172
History 190B	Music 11	Religious Studies 12	Spanish 139
History 190C	Music 28	Religious Studies 15Y	Spanish 141
History 190D	Music 105	Religious Studies 21	Spanish 141S
History 191A	Music 126	Religious Studies 23	Spanish 147
History 191B	Music 129A	Religious Studies 30	Spanish 148
History 191C	Music 129B	Religious Studies 42	Spanish 148S
History 191D	Music 129C	Religious Studies 60	Spanish 149
History 191E	Music 129D	Religious Studies 65C	Spanish 160
History 191F	Native American Studies 1	Religious Studies 67	Spanish 170
History 193A	Native American Studies 5	Religious Studies 68	Spanish 170S
History 193B	Native American Studies 7	Religious Studies 69	Spanish 172
History 193D	Native American Studies 10	Religious Studies 70	Spanish 173
History 194A	Native American Studies 32	Religious Studies 80	Spanish 174
History 194B	Native American Studies 33	Religious Studies 102	Spanish 175
History 194C	Native American Studies 46	Religious Studies 103	Spanish 176
History 195B	Native American Studies 101	Religious Studies 104	Technocultural Studies 159
History 196A	Native American Studies 107	Religious Studies 105	Textiles & Clothing 7
History 196B	Native American Studies 115	Religious Studies 106	Textiles & Clothing 8
Human Development 12	Native American Studies 116	Religious Studies 115	Textiles & Clothing 107
Human Development 103	Native American Studies 117	Religious Studies 120	Textiles & Clothing 174
Human Development 160	Native American Studies 120	Religious Studies 131	Wild, Fish & Conserv Biol 10
Human Rights 131	Native American Studies 123	Religious Studies 134	Women's Studies 20
Human Rights 134	Native American Studies 130A	Religious Studies 143	Women's Studies 25
Humanities 7	Native American Studies 130B	Religious Studies 144	Women's Studies 50
Humanities 8	Native American Studies 130C	Religious Studies 150	Women's Studies 60
Humanities 13	Native American Studies 133	Religious Studies 156	Women's Studies 70
Humanities 15	Native American Studies 133A	Religious Studies 157	Women's Studies 102
Humanities 60	Native American Studies 133B	Religious Studies 158	Women's Studies 130
International Agricultural Dev 10	Native American Studies 157	Religious Studies 160	Women's Studies 136
International Agricultural Dev 103	Native American Studies 181A	Religious Studies 161	Women's Studies 137
Italian 108	Native American Studies 181B	Religious Studies 161B	Women's Studies 138
Italian 108S	Native American Studies 181C	Religious Studies 162	Women's Studies 139
Italian 121	Native American Studies 188	Religious Studies 163	Women's Studies 140
Italian 121S	Native American Studies 191	Religious Studies 165	Women's Studies 145
Italian 141	Nutrition 120AN	Religious Studies 175A	Women's Studies 148
Italian 150	Nutrition 120BN	Russian 129	Women's Studies 158
Japanese 10	Persian 1	Russian 139	Women's Studies 160
Japanese 25	Philosophy 7Y	Russian 140	Women's Studies 162
Japanese 50	Philosophy 11	Russian 141	Women's Studies 164
Japanese 101	Philosophy 14	Russian 143	Women's Studies 165
Japanese 102	Philosophy 118	Russian 150	Women's Studies 170
Japanese 103	Philosophy 119	Science & Tech Studies 32	Women's Studies 175
Japanese 104	Physical Education 120	Science & Tech Studies 120	Women's Studies 178A
Japanese 105	Plant Biology 143	Science & Tech Studies 121	Women's Studies 178B
Japanese 106	Plant Science 12	Science & Tech Studies 129	Women's Studies 178C
Japanese 107	Political Science 124	Science & Tech Studies 150	Women's Studies 178D
Japanese 108	Political Science 126	Science and Society 1	Women's Studies 178E
Japanese 109	Political Science 140B	Science and Society 7	Women's Studies 178F
Japanese 151	Political Science 143A	Science and Society 12	Women's Studies 179
Japanese 152	Political Science 143B	Science and Society 15	Women's Studies 180
Japanese 156	Political Science 146A	Science and Society 25	Women's Studies 182
Jewish Studies 10	Political Science 146B	Science and Society 40	Women's Studies 184
Jewish Studies 101	Political Science 148B	Science and Society 41	Women's Studies 187
Jewish Studies 110	Political Science 148C	Science and Society 135S	Women's Studies 195
Jewish Studies 111	Political Science 152	Sociology 4	

## WRITING EXPERIENCE (WRT)

These courses satisfy the GE requirement for writing experience. Many of these courses also provide GE credit for topical breadth or social-cultural diversity. Refer to the topical breadth and social-cultural diversity course lists to determine if any additional GE credit applies.

Afr Am & Afr Std 12	Afr Am & Afr Std 162	American Studies 5	American Studies 155
Afr Am & Afr Std 15	Afr Am & Afr Std 163	American Studies 10	American Studies 156
Afr Am & Afr Std 16	Afr Am & Afr Std 170	American Studies 21	American Studies 157
Afr Am & Afr Std 17	Afr Am & Afr Std 172	American Studies 25	Animal Science 1
Afr Am & Afr Std 50	Afr Am & Afr Std 175A	American Studies 30	Animal Science 2
Afr Am & Afr Std 52	Afr Am & Afr Std 185	American Studies 55	Animal Science 42
Afr Am & Afr Std 80	Agricul & Res Econ 15	American Studies 59	Animal Science 106
Afr Am & Afr Std 107A	Agricul & Res Econ 150	American Studies 110	Animal Science 124
Afr Am & Afr Std 107B	Agricultural Education 100	American Studies 120	Animal Science 136
Afr Am & Afr Std 107C	Agricultural Education 160	American Studies 130	Animal Science 141
Afr Am & Afr Std 107D	Agricultural Education 172	American Studies 139	Animal Science 146
Afr Am & Afr Std 111	American Studies 1A	American Studies 151	Animal Science 148
Afr Am & Afr Std 152	American Studies 1B	American Studies 152	Animal Science 170
Afr Am & Afr Std 153	American Studies 1C	American Studies 153	Anthropology 1
Afr Am & Afr Std 157	American Studies 1E	American Studies 154	Anthropology 2

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Anthropology 4	Art Studio 150	Comparative Literature 13	English 4
Anthropology 5	Asian American Studies 1	Comparative Literature 14	English 5F
Anthropology 13	Asian American Studies 2	Comparative Literature 20	English 5NF
Anthropology 15	Asian American Studies 4	Comparative Literature 25	English 40
Anthropology 23	Asian American Studies 150B	Comparative Literature 53A	English 41
Anthropology 24	Atmospheric Science 10	Comparative Literature 53B	English 42
Anthropology 32	Avian Sciences 11	Comparative Literature 53C	English 43
Anthropology 34	Avian Sciences 13	Comparative Literature 100	English 44
Anthropology 50	Biological Sciences 10	Comparative Literature 110	English 45
Anthropology 101	Biological Sciences 132	Comparative Literature 120	English 105
Anthropology 105	Biotechnology 188	Comparative Literature 135	English 107
Anthropology 109	Chemistry 10	Comparative Literature 138	English 110A
Anthropology 110	Chemistry 115	Comparative Literature 140	English 110B
Anthropology 117	Chemistry 125	Comparative Literature 141	English 111
Anthropology 120	Chemistry 150	Comparative Literature 144	English 113A
Anthropology 121	Chicano Studies 10	Comparative Literature 145	English 113B
Anthropology 122A	Chicano Studies 21S	Comparative Literature 146	English 115
Anthropology 122B	Chicano Studies 40	Comparative Literature 147	English 117
Anthropology 124	Chicano Studies 40S	Comparative Literature 148	English 120
Anthropology 125B	Chicano Studies 110	Comparative Literature 151	English 122
Anthropology 126A	Chicano Studies 112	Comparative Literature 152	English 123
Anthropology 126B	Chicano Studies 121	Comparative Literature 152S	English 125
Anthropology 127	Chicano Studies 123	Comparative Literature 153	English 130
Anthropology 128A	Chicano Studies 141	Comparative Literature 154	English 133
Anthropology 128B	Chicano Studies 150	Comparative Literature 155	English 137
Anthropology 129	Chicano Studies 161	Comparative Literature 156	English 138
Anthropology 130A	Chicano Studies 181	Comparative Literature 157	English 139
Anthropology 130BN	Chicano Studies 182	Comparative Literature 158	English 140
Anthropology 132	Chinese 10	Comparative Literature 159	English 141
Anthropology 134	Chinese 11	Comparative Literature 160A	English 142
Anthropology 136	Chinese 50	Comparative Literature 160B	English 143
Anthropology 139AN	Chinese 100A	Comparative Literature 161A	English 144
Anthropology 139BN	Chinese 102	Comparative Literature 161B	English 146
Anthropology 140A	Chinese 103	Comparative Literature 163	English 147
Anthropology 140B	Chinese 104	Comparative Literature 164A	English 149
Anthropology 141B	Chinese 105	Comparative Literature 164B	English 150A
Anthropology 142	Chinese 106	Comparative Literature 164C	English 150B
Anthropology 143A	Chinese 107	Comparative Literature 164D	English 153
Anthropology 144	Chinese 108	Comparative Literature 165	English 155A
Anthropology 145	Chinese 109A	Comparative Literature 165S	English 155B
Anthropology 146N	Chinese 109C	Comparative Literature 166	English 155C
Anthropology 148A	Chinese 109D	Comparative Literature 166A	English 156
Anthropology 149A	Chinese 109E	Comparative Literature 166B	English 158A
Anthropology 149B	Chinese 109G	Comparative Literature 167	English 158B
Anthropology 151	Chinese 109H	Comparative Literature 168A	English 159
Anthropology 152	Chinese 109I	Comparative Literature 168B	English 160
Anthropology 153	Chinese 110	Comparative Literature 169	English 161A
Anthropology 154A	Chinese 150	Comparative Literature 170	English 161B
Anthropology 154B	Cinema & Technocultural Stud 146A	Comparative Literature 172	English 162
Anthropology 157L (course 157 required concurrently)	Cinema & Technocultural Stud 148B	Comparative Literature 175	English 163
Anthropology 158	Classics 1	Comparative Literature 180	English 164
Anthropology 170	Classics 2	Comparative Literature 180S	English 165
Anthropology 172	Classics 20	Consumer Sciences 100	English 166
Anthropology 173	Classics 25	Critical Theory 101	English 167
Anthropology 176	Classics 50	Dramatic Art 1	English 168
Anthropology 178	Classics 102	Dramatic Art 1S	English 171A
Anthropology 183	Classics 110	Dramatic Art 11S	English 171B
Arabic 101A	Classics 140	Dramatic Art 114	English 173
Arabic 140	Classics 141	Dramatic Art 150	English 175
Art History 100	Classics 142	Dramatic Art 154	English 177
Art History 110	Classics 143	Dramatic Art 155	English 178
Art History 148	Classics 171	Dramatic Art 156AN	English 179
Art History 155	Classics 172A	Dramatic Art 156B	English 180
Art History 156	Classics 172B	Dramatic Art 156C	English 181A
Art History 163A	Classics 173	Dramatic Art 156D	English 181B
Art History 163B	Classics 174	Dramatic Art 158	English 182
Art History 163C	Classics 175	East Asian Studies 88	English 184
Art History 163D	Classics 190	East Asian Studies 113	English 185A
Art History 164	Communication 1 *	Education 110	English 185B
Art History 168	Communication 143	Education 119	English 185C
Art History 172A	Communication 189A	Education 120	English 186
Art History 172B	Communication 189B	Education 122	English 187A
Art History 173	Communication 189C	Education 147	English 188A
Art History 175	Communication 189D	Engineering 10	English 189
Art History 176A	Comm & Reg Devlpmnt 1	Engineering 45	Entomology 2
Art History 176B	Comm & Reg Devlpmnt 2	Engr: Biomedical 116	Entomology 100
Art History 178B	Comm & Reg Devlpmnt 20	Engr: Chemical 155A	Entomology 100L (course 100 required concurrently)
Art History 178C	Comm & Reg Devlpmnt 147	Engr: Chemical 155B	Entomology 103
Art History 179B	Comm & Reg Devlpmnt 149	Engr: Chemical 161L	Entomology 107
Art History 182	Comm & Reg Devlpmnt 151	Engr: Civil & Environ 123	Entomology 109
Art History 183B	Comm & Reg Devlpmnt 152	Engr: Civil & Environ 146	Entomology 110
Art History 183C	Comm & Reg Devlpmnt 154	Engr: Civil & Environ 155	Entomology 117
Art History 184	Comm & Reg Devlpmnt 157	Engr: Civil & Environ 163	Entomology 119
Art History 185	Comm & Reg Devlpmnt 176	Engr: Civil & Environ 165	Entomology 153
Art History 186	Comparative Literature 1 *	Engr: Computer Science 15	Entomology 156L (course 156 required concurrently)
Art History 187	Comparative Literature 2 *	Engr: Computer Science 188	Entomology 158
Art History 188A	Comparative Literature 3 *	Engr: Materials Science 162L	Environmental Sci & Management 8
Art History 188B	Comparative Literature 4 *	Engr: Materials Science 172L	Environmental Sci & Management 131
Art History 189	Comparative Literature 5	Engr: Materials Science 174	Environ Science & Policy 101
Art History 190	Comparative Literature 6	Engr: Materials Science 174L	Environ Science & Policy 105
Art History 210	Comparative Literature 7	Engr: Materials Science 180	Environ Science & Policy 121
Art Studio 30	Comparative Literature 8	Engr: Materials Science 181	Environ Science & Policy 161
Art Studio 147	Comparative Literature 9	Engr: Materials Science 182	Environ Science & Policy 163
Art Studio 148	Comparative Literature 11	Engr: Materials Science 260	
Art Studio 149	Comparative Literature 12	English 3 *	

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Environmental Toxicology 20	History 10C	History 193A	Linguistics 150
Environmental Toxicology 110	History 12	History 193B	Linguistics 152
Evolution and Ecology 2	History 15	History 193D	Linguistics 160
Evolution and Ecology 138	History 17A	History 194A	Linguistics 163
Evolution and Ecology 141	History 17B	History 195B	Linguistics 166
Exercise Biology 104L	History 72A	History 196A	Linguistics 180
Fiber And Polymer Science 110	History 72B	History 196B	Linguistics 182
Film Studies 1	History 102S	Honors Challenge 94	Mathematics 108
Film Studies 120	History 110	Honors Challenge 194	Mathematics 189
Film Studies 121	History 111A	Human Development 101	Med - Public Health Sciences 175W
Film Studies 121S	History 111B	Human Development 102	Medieval Studies 20A
Film Studies 124	History 111C	Human Development 117	Medieval Studies 20B
Film Studies 125	History 112A	Human Development 120	Medieval Studies 130A
Film Studies 127	History 112B	Human Development 161	Medieval Studies 130B
Film Studies 129	History 113	Human Rights 130	Middle East/S. Asian Std 100
Film Studies 142	History 115A	Human Rights 131	Middle East/S. Asian Std 111A
Film Studies 176A	History 115B	Human Rights 134	Middle East/S. Asian Std 121A
Film Studies 176B	History 115C	Humanities 1D (course 1 required	Middle East/S. Asian Std 121C
Film Studies 189	History 115D	concurrently)	Middle East/S. Asian Std 131A
Food Science & Technology 55	History 115E	Humanities 3	Middle East/S. Asian Std 180
French 50	History 115F	Humanities 4D (course 4 required	Middle East/S. Asian Std 181C
French 51	History 121A	concurrently)	Music 10
French 52	History 121B	Humanities 7	Music 24A
French 53	History 121C	Humanities 8	Music 24B
French 107A	History 125	Humanities 9D (course 9 required	Music 24C
French 107B	History 130A	concurrently)	Music 28
French 107S	History 131B	Humanities 13	Music 105
French 119A	History 131C	Humanities 15	Music 106
French 119B	History 132	Humanities 60	Music 110A
French 120	History 136	Humanities 144	Music 110B
French 121	History 138A	Humanities 180	Music 110C
French 125	History 138B	Hydrologic Science 10	Music 110D
French 125S	History 138C	Integrated Studies 8A	Music 110E
French 127	History 139A	Integrated Studies 8B	Music 110F
French 130	History 139B	Integrated Studies 8C	Music 110G
Geology 2G (course 2 required	History 141	International Agricultural Dev 10	Music 115
concurrently)	History 142A	Italian 50	Music 124A
Geology 3G (course 3 required	History 142B	Italian 108	Music 124B
concurrently)	History 143	Italian 108S	Music 126
Geology 16G	History 144B	Italian 120A	Music 129A
Geology 36	History 145	Italian 121	Music 129B
Geology 105	History 146A	Italian 121S	Music 129C
Geology 106	History 146B	Italian 140	Music 129D
Geology 108	History 147A	Italian 141	Native American Studies 5 *
Geology 109L (course 109 required	History 147B	Italian 142	Native American Studies 7
concurrently)	History 147C	Italian 145	Native American Studies 10
Geology 110	History 148A	Italian 145S	Native American Studies 46
Geology 115	History 148B	Italian 150	Native American Studies 120
Geology 134	History 148C	Japanese 10	Native American Studies 123
Geology 143	History 149	Japanese 25	Native American Studies 130A
Geology 145	History 151A	Japanese 50	Native American Studies 130B
German 10	History 151B	Japanese 101	Native American Studies 130C
German 11	History 151C	Japanese 102	Native American Studies 133B
German 40	History 151D	Japanese 103	Native American Studies 181A
German 48	History 159	Japanese 104	Native American Studies 181B
German 105	History 160	Japanese 105	Native American Studies 181C
German 112	History 162	Japanese 106	Native American Studies 188
German 113	History 167	Japanese 107	Nematology 10V
German 114	History 169A	Japanese 108	Nematology 150
German 115	History 169B	Japanese 151	Neuro, Physio & Behavior 104L
German 116	History 170A	Japanese 152	Neuro, Physio & Behavior 111L
German 117	History 170B	Japanese 156	Nutrition 11
German 118A	History 171A	Jewish Studies 10	Nutrition 114
German 118B	History 171B	Jewish Studies 101	Nutrition 115
German 118C	History 171D	Jewish Studies 110	Nutrition 117
German 118E	History 172	Jewish Studies 111	Philosophy 1
German 119	History 173	Jewish Studies 112	Philosophy 5
German 141	History 174A	Jewish Studies 116	Philosophy 11
German 142	History 174B	Jewish Studies 120	Philosophy 14
German 144	History 174C	Jewish Studies 121	Philosophy 15
German 176A	History 175	Landscape Architecture 1	Philosophy 17
Greek 101	History 177A	Landscape Architecture 2	Philosophy 21
Greek 102	History 177B	Landscape Architecture 3	Philosophy 22
Greek 103A	History 178A	Landscape Architecture 30	Philosophy 24
Greek 103B	History 178B	Latin 101	Philosophy 30
Greek 104	History 179	Latin 102	Philosophy 32
Greek 110	History 180AN	Latin 103	Philosophy 38
Greek 111	History 180BN	Latin 104	Philosophy 101
Greek 112	History 181	Latin 105	Philosophy 102
Greek 113	History 183A	Latin 106	Philosophy 103
Greek 114	History 183B	Latin 108	Philosophy 105
Greek 115	History 184	Latin 109	Philosophy 107
Greek 116	History 185A	Latin 110	Philosophy 108
History 3	History 185B	Latin 112	Philosophy 109
History 4A	History 189	Latin 115	Philosophy 114
History 4B	History 190A	Latin 116	Philosophy 115
History 4C	History 190B	Latin 125	Philosophy 118
History 6	History 190C	Law 210A	Philosophy 119
History 7A	History 190D	Law 248T	Philosophy 123
History 7B	History 191A	Law 286	Philosophy 125
History 7C	History 191B	Law 286C	Physics 10
History 9A	History 191C	Linguistics 1	Plant Biology 143
History 9B	History 191D	Linguistics 1Y	Plant Pathology 140
History 10A	History 191E	Linguistics 6	Plant Science 12
History 10B	History 191F	Linguistics 141	Plant Science 14

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Plant Science 130	Political Science 170	Religious Studies 163	Statistics 10
Plant Science 141	Political Science 171	Religious Studies 165	Textiles & Clothing 7
Plant Science 188	Political Science 172	Religious Studies 175A	Textiles & Clothing 107
Political Science 1	Political Science 174	Russian 122	University Writing Program 1 *
Political Science 2	Political Science 175	Russian 129	University Writing Program IV *
Political Science 3	Political Science 176	Russian 133	University Writing Program IY
Political Science 4	Political Science 179	Russian 140	University Writing Program 18 *
Political Science 5	Political Science 180	Russian 141	University Writing Program 19 *
Political Science 7	Political Science 183	Russian 143	University Writing Program 101 *
Political Science 100	Political Science 187	Russian 150	University Writing Program 102A *
Political Science 102	Political Science 190	Science & Tech Studies 20	University Writing Program 102B *
Political Science 104	Political Science 192A	Science & Tech Studies 32	University Writing Program 102C *
Political Science 105	Political Science 192B	Science & Tech Studies 50	University Writing Program 102D *
Political Science 106	Political Science 193W	Science & Tech Studies 108	University Writing Program 102E *
Political Science 107	Portuguese 141	Science & Tech Studies 109	University Writing Program 102F *
Political Science 108	Psychology 141	Science & Tech Studies 120	University Writing Program 102G *
Political Science 109	Psychology 142	Science & Tech Studies 121	University Writing Program 102H
Political Science 110	Psychology 158	Science & Tech Studies 129	University Writing Program 102I
Political Science 112	Psychology 162	Science & Tech Studies 130A	University Writing Program 102J
Political Science 113	Psychology 170	Science & Tech Studies 130B	University Writing Program 102K
Political Science 114	Psychology 175	Science & Tech Studies 131	University Writing Program 102L
Political Science 115	Psychology 185	Science & Tech Studies 150	University Writing Program 104A *
Political Science 116	Religious Studies 1	Science & Tech Studies 161	University Writing Program 104B *
Political Science 117	Religious Studies 1A	Science & Tech Studies 164	University Writing Program 104C *
Political Science 118A	Religious Studies 1B	Science & Tech Studies 165	University Writing Program 104D *
Political Science 118B	Religious Studies 1C	Science & Tech Studies 173	University Writing Program 104E *
Political Science 118C	Religious Studies 1D	Science and Society 1	University Writing Program 104F *
Political Science 119	Religious Studies 1E	Science and Society 2	University Writing Program 104I
Political Science 120	Religious Studies 1F	Science and Society 3	University Writing Program 110
Political Science 121	Religious Studies 1G	Science and Society 4	University Writing Program 111A
Political Science 122	Religious Studies 10	Science and Society 5	University Writing Program 111B
Political Science 123	Religious Studies 10A	Science and Society 7	University Writing Program 111C
Political Science 124	Religious Studies 11	Science and Society 7V	University Writing Program 112A
Political Science 126	Religious Studies 12	Science and Society 8	Viticulture & Enology 90X
Political Science 129	Religious Studies 15Y	Science and Society 9	Viticulture & Enology 123L
Political Science 130	Religious Studies 21	Science and Society 10	Washington Center 175
Political Science 131	Religious Studies 23	Science and Society 11	Washington Center 193
Political Science 132	Religious Studies 30	Science and Society 12	Wild, Fish & Conserv Biol 10
Political Science 135	Religious Studies 40	Science and Society 13	Wild, Fish & Conserv Biol 11
Political Science 136	Religious Studies 42	Science and Society 15	Wild, Fish & Conserv Biol 50
Political Science 137	Religious Studies 60	Science and Society 18	Wild, Fish & Conserv Biol 51
Political Science 140A	Religious Studies 65C	Science and Society 20	Wild, Fish & Conserv Biol 101
Political Science 140B	Religious Studies 67	Science and Society 25	Wild, Fish & Conserv Biol 102L
Political Science 140C	Religious Studies 68	Science and Society 30	Wild, Fish & Conserv Biol 121
Political Science 142A	Religious Studies 69	Science and Society 40	Wild, Fish & Conserv Biol 153
Political Science 142B	Religious Studies 70	Science and Society 120	Wild, Fish & Conserv Biol 155
Political Science 143A	Religious Studies 80	Science and Society 135S	Wild, Fish & Conserv Biol 156
Political Science 143B	Religious Studies 102	Science and Society 140	Women's Studies 20
Political Science 144A	Religious Studies 103	Sociology 2	Women's Studies 25
Political Science 144B	Religious Studies 104	Sociology 3	Women's Studies 50
Political Science 146A	Religious Studies 105	Sociology 4	Women's Studies 60
Political Science 146B	Religious Studies 106	Sociology 5	Women's Studies 102
Political Science 147A	Religious Studies 115	Sociology 11	Women's Studies 136
Political Science 147B	Religious Studies 120	Sociology 25	Women's Studies 137
Political Science 147C	Religious Studies 125	Sociology 120	Women's Studies 138
Political Science 147D	Religious Studies 126	Sociology 126	Women's Studies 139
Political Science 148A	Religious Studies 131	Sociology 128	Women's Studies 160
Political Science 148B	Religious Studies 134	Sociology 131	Women's Studies 170
Political Science 148C	Religious Studies 141A	Sociology 134	Women's Studies 175
Political Science 150	Religious Studies 141B	Sociology 135	Women's Studies 178A
Political Science 151	Religious Studies 141C	Sociology 141	Women's Studies 178B
Political Science 152	Religious Studies 143	Sociology 143B	Women's Studies 178C
Political Science 153	Religious Studies 144	Sociology 145A	Women's Studies 178D
Political Science 154	Religious Studies 150	Sociology 145B	Women's Studies 178E
Political Science 155	Religious Studies 156	Sociology 146	Women's Studies 178F
Political Science 160	Religious Studies 157	Sociology 149	Women's Studies 179
Political Science 162	Religious Studies 158	Sociology 172	Women's Studies 182
Political Science 163	Religious Studies 160	Sociology 181	Women's Studies 184
Political Science 164	Religious Studies 161	Spanish 147	Women's Studies 191
Political Science 165	Religious Studies 161B	Spanish 149	Women's Studies 195
Political Science 168	Religious Studies 162	Spanish 160	

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

## TOPICAL BREADTH ASSIGNED SUBJECT AREAS FOR MAJORS AND MINORS; PRE-FALL 2011

The following section only pertains to students who matriculated to UC Davis prior to Fall 2011.

### **Arts & Humanities**

#### **Majors**

African American and African Studies  
American Studies  
Art History  
Art Studio  
Asian American Studies  
Chicana/Chicano Studies Chinese Cinema and Digital Media  
Classical Civilization  
Comparative Literature  
Design English French  
Gender, Sexuality and Women's Studies German History Italian Japanese  
Landscape Architecture Medieval and Early Modern Studies Music Native American Studies Philosophy Religious Studies Russian Spanish  
Theatre and Dance

#### **Minors**

African American and African Studies  
American Studies  
Art History  
Art Studio  
Asian American Studies  
Chicana/Chicano Studies Chinese  
Classical Civilization  
Comparative Literature  
Dramatic Art English  
Film Studies French  
Gender, Sexuality and Women's Studies German  
Global and International Studies (Arts and Humanities Emphasis)  
Greek History Italian Japanese  
Jewish Studies Landscape Restoration Latin  
Luso-Brazilian Studies Medieval and Early Modern Studies Music  
Native American Studies

Philosophy  
Professional Writing  
Religious Studies  
Russian  
Sexuality Studies  
Social and Ethnic Relations  
Spanish

### **Science & Engineering**

#### **Majors**

Agricultural & Environmental Education  
Animal Biology  
Animal Science  
Animal Science & Management Anthropology (B.S. degree only)  
Applied Mathematics  
Applied Physics  
Atmospheric Science  
Biochemistry and Molecular Biology  
Biological Sciences  
Biotechnology  
Cell Biology  
Chemistry  
Clinical Nutrition  
Cognitive Science (B.S. degree only)  
Computer Science  
Ecological Management and Restoration  
Engineering (all majors)  
Entomology  
Environmental Horticulture & Urban Forestry  
Environmental Science & Management  
Environmental Toxicology  
Evolution, Ecology & Biodiversity  
Exercise Biology  
Fiber and Polymer Science  
Food Science  
Genetics  
Geology  
Hydrology  
Marine and Coastal Science  
Mathematical and Scientific Computation  
Mathematical Analytics and Operations Research  
Mathematics  
Microbiology  
Natural Sciences  
Neurobiology, Physiology, and Behavior  
Nutrition Science  
Physics  
Plant Biology  
Plant Sciences  
Psychology (B.S. degree)  
Statistics  
Sustainable Agriculture & Food Systems

Technology Management  
Viticulture & Enology  
Wildlife, Fish, & Conservation Biology

#### **Minors**

Agri Computing & Info Systems  
Agricultural Pest Management  
Agricultural Systems & Environment  
Animal Science—Animal Biology  
Animal Science—Animal Genetics  
Animal Science—Aquaculture  
Animal Science—Dairy/Livestock  
Animal Science—Equine  
Anthropology (Evolutionary emphasis)  
Apiculture  
Applied Computing & Info Systems  
Atmospheric Science  
Avian Sciences  
Biological Sciences  
Chemistry  
Community Nutrition  
Computer Science  
Construction Engineering and Management  
Engineering (all majors)  
Environmental Geology  
Environmental Horticulture  
Environmental Toxicology  
Exercise Biology  
Fiber and Polymer Science  
Forensic Entomology  
Fungal Biology & Ecology  
Geographic Information Systems  
Geographic Studies  
Geology  
Geophysics  
Hydrologic Science  
Hydrology  
Insect Biology  
Insect Ecology & Evolution  
International Science Studies  
Landscape Restoration  
Mathematics  
Medical-Veterinary Entomology  
Nematology  
Nutrition Science  
Nutrition and Food  
Oceanography  
Physics  
Plant Biology  
Precision Agriculture  
Quantitative Biology and Bioinformatics  
Science and Society  
Soil Science  
Statistics  
Watershed Science  
Wildlife, Fish, and Conservation Biology

### **Social Sciences**

#### **Majors**

Anthropology (A.B. degree)  
Cognitive Science (A.B. degree only)  
Communication  
Community and Regional Develop East Asian Studies  
Economics  
Environmental Policy Analysis & Planning  
Human Development  
International Agricultural Development  
International Relations  
Linguistics  
Managerial Economics  
Middle East/South Asia Studies  
Political Science  
Political Science—Public Service Psychology (A.B. degree)  
Science & Tech Studies  
Sociology  
Sociology—Organizational Studies  
Textiles & Clothing

#### **Minors**

Aging and Adult Development  
Anthropology (General emphasis)  
Anthropology (Sociocultural emphasis)  
Arab Studies  
Coaching Principles and Methods  
Community Development  
Contemporary Leadership  
East Asian Studies  
Economics  
Education  
Energy Policy  
Environmental Policy Analysis  
Global and International Studies (Social Science emphasis)  
History & Philosophy of Science  
Human Development  
India and South Asia Studies  
International Agricultural Development Latin American and Hemispheric Studies  
Iran and Persian Studies  
Linguistics  
Linguistics for Language Teachers  
Managerial Economics  
Middle East/South Asia Studies  
Political Science  
Psychology  
Science and Society  
Sociology  
Technology Management  
Textiles & Clothing  
War-Peace Studies

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

## GENERAL EDUCATION THEME OPTIONS

The following section only pertains to students who matriculated to UC Davis prior to Fall 2011.

General Education theme options are sets of GE courses sharing a common intellectual theme. These GE theme options are not a separate element of the GE requirement, but a way of selecting your GE courses so that you may benefit from a coherent focus of study while completing the GE requirement. Completion of a theme satisfies the GE requirement for students with majors assigned to the GE topical breadth area of Arts and Humanities. Students with majors assigned to the topical breadth area of either Science and Engineering or Social Science will need to complete additional GE courses in Arts and Humanities to satisfy the campus GE requirement.

### Global Population and Environmental Issues

For centuries, there have been concerns and predictions about population growth and its potential effects on the environment and the quality of life. Perspectives on population and environmental issues often vary based on such factors as gender, social class, culture, nation, race/ethnicity, and religion. In this group of courses, students will learn about the complex interplay among environmental, economic, and ethical issues through the study of global population patterns. They will learn how science addresses the use of natural resources by humans, along with the fundamentals of environmental impacts such as global warming. This option group of courses explores diverse perspectives on global population and environmental issues by examining biological, physical, and social processes that influence the everyday lives of people around the world.

Topics might include the social, economic, and environmental challenges of population growth; and the ethics and dilemmas of natural resource use.

#### Global Population

Atmospheric Science 5 [or 10]	SciEng, Wrt
Human Development 117	SciEng, Wrt
Agricultural and Resource Economics 15	SocSci, Div, Wrt
Science and Society 1 [or Fiber and Polymer Science 110]	SciEng or SocSci, Div, Wrt SciEng or SocSci, Wrt]
International Agricultural Development 10, SocSci, Div, Wrt [or Community & Regional Development 1]	SocSci, Div, Wrt

### Biodiversity and Cultural Diversity

The nations with the greatest biodiversity often have tremendous ethnic and cultural diversity. This option examines diversity in many interrelated contexts: biological diversity and the impact of contemporary humans; values and cultural practices in regard to production and consumption; the clothes people wear; creation and use of social spaces; and the preservation of genetic resources for food, fiber, and pharmaceuticals.

Topics might include conservation biology; integration of human and natural systems; cultural expression through clothing and appearance; and discussion of what are cultural and social rights.

#### Biodiversity and Cultural Diversity

Wildlife, Fish and Conservation Biology 10	SciEng, Div, Wrt
Plant Biology 11	SciEng, Wrt
Textiles and Clothing 7	SocSci, Div, Wrt
Community and Regional Development 2	SocSci, Div, Wrt
Landscape Architecture 2	SocSci, Wrt

### Food and Fiber

This option focuses on food and fiber systems, from their plant, animal, or synthetic sources to their ultimate use by humans for health, safety, communication, and pleasure. Understanding these systems enables students to see the connections between the food and clothes that are part of our everyday lives and the scientific, social, and cultural issues that make them so significant to society as a whole.

Topics might include food and clothing safety, quality, and availability; media and consumer perceptions; and cultural histories, values, and meanings.

#### Food and Fiber

Animal Science 1 [or Plant Biology 12]	SciEng, Wrt SciEng, Div, Wrt]
Nutrition 10 and Nutrition 11 [or Food Science and Technology 10]	SciEng SciEng, Wrt SciEng or SocSci]
Textiles and Clothing 6	SciEng
Textiles and Clothing 7 or 107	SocSci, Div, Wrt
Science and Society 1	SciEng or SocSci, Div, Wrt
Viticulture and Enology 3	SciEng or SocSci

### Changing Agriculture

Changing demographics, environmental issues, and social-political trends in California all play a role in public perceptions and policies related to our food and fiber systems, natural resources, and community values. These perceptions, policies, and values need to be critically examined in the context of larger global economic trends and environmental health and safety. In this group of courses, students can explore a range of challenging issues related to the complex interplay between rural and urban needs and values.

Topics might include holistic approaches to agriculture; international migration and agricultural development; and how plants and animals influence the course of history.

#### Changing Agriculture Theme Option

Animal Science 1	SciEng, Wrt
Entomology 110	SciEng, Wrt
Plant Biology 12	SciEng, Div, Wrt
Agricultural and Resource Economics 15	SocSci, Div, Wrt
Environmental & Resource Sciences 121*	SciEng, Wrt
Science and Society 2	SciEng or SocSci, Wrt

\* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.

† Also assigned to another area of topical breadth.

# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).



INDEX

# INDEX

## A

### academic calendar

Betty Irene Moore School of Nursing 144

School of Law 132

School of Medicine 139

UC Davis 1

### accreditation 20

### ACT Plus Writing Examination 39, 52

### Activities and Recreation Center (ARC) 66, 67, 68

### activities, extracurricular 66

### address

changing student 85

directory 6

### admission

advanced standing, School of Law 131

after you apply for 51

Betty Irene Moore School of Nursing 143

criteria, undergraduate

*preparing for university work* 39

deferred enrollment 52

filings dates 1, 39

freshman 39

*residency eligibility* 40

*residency eligibility, out-of-state applicants* 40

graduate 121

*applying for* 121

*international students* 122

Graduate School of Management 134

international students 50

procedures, undergraduate

*application fees* 39

*application filing information* 39

School of Education 127

School of Law 130

School of Medicine 138

undergraduate 39

*advanced placement examinations* 40

*applying for* 39

*domestic filing fee* 39

*international filing fee* 39

*local path* 40

*statewide path* 40

*transfer credit* 40

### Adult Fitness Program 29

### Advanced Highway Maintenance & Construction Technology Center (AHMCT) 30

### Advanced Laboratory Fusion Science and Engineering (CALFUSE), Center for 30

### Advanced Materials Characterization and Testing Laboratory (AMCaT) 30

### Advanced Transportation Infrastructure Research Center Facility (ATIRC) 30

### advising

academic

*Agricultural and Environmental Sciences* 75

*Biological Sciences* 75

Agricultural and Environmental Sciences, college of 75

Biological Sciences, college of 75

college 75

Engineering, college of 75

Letters and Science, college of 76

peer, academic 77

services 77

### Aerospace Studies (Air Force) 463

### African American and African Studies 150

### African Diaspora Center for Student Success 68

### Agricultural and Environmental Chemistry, Graduate Group 152

### Agricultural and Environmental Education 153

### Agricultural and Environmental Sciences, College of 20, 75, 100

### Agricultural and Managerial Economics 154

### Agricultural and Natural Resources Engineering 268

### Agricultural and Resource Economics 154

### Agricultural Computing and Information Systems 158

### Agricultural Management and Rangeland Resources 158

### Agricultural Sustainability Institute 30

### Agricultural Systems and Environment 158

### Agronomy 158

### Agronomy and Range Science 158

### Alcohol, Tobacco and Other Drug Risk Reduction (ATOD) 66

### alumni 71

scholarships 60

UC Davis Welcome Center 6

### American History and Institutions requirements 108

### American Studies 158

### Anatomy 160

### Anatomy, Physiology, and Cell Biology 160

### Anesthesiology and Pain Medicine 160

### Animal Behavior Graduate Group 160

### Animal Biology 161

### Animal Biology, Graduate Group 162

### Animal Genetics 163

### Animal Physiology 163

### Animal Science 163, 164

### Animal Science and Management 168

### Animal Surgery Laboratory 33

### Anthropology 168

### Applied Behavioral Sciences 175

### Applied Biological Systems Technology 175

### Applied Computing and Information Systems 176

### Applied Mathematics, Graduate Group 177

### Applied Physics 177

### Applied Science-Engineering 266

### Aquaculture 177

### Aquatic Animals 164

### Arabic 177

### Arboretum 26

### art 69

Basement Gallery 69

Carl Gorman Museum 70

Fine Arts Collection 69

galleries 69

Manetti Shrem Museum 69

Mondavi Center for the Performing Arts 69

music 69

Theatre and Dance 69

UC Davis Design Museum 69

### Art History 177

### Art Studio 180

### Asian American Studies 183

### Asian Studies 185

### Associated Students of UC Davis (ASUCD) 70

### Astronomy 185

### ASUCD 67

### athletics

intercollegiate 68

intramural 68

### Atmospheric Science 185

### Atmospheric Science, Graduate Group 188

### Avian Sciences 164, 188

### Avian Sciences, Graduate Group 189

### awards 60, 97

chancellor's, for excellence in mentoring undergraduate research 97

special prize 60

## B

### bachelor's degree requirements 106

### Basement Gallery 69

- Betty Irene Moore School of Nursing** 141, 487  
 Doctor of Philosophy 141
- bicycles**  
 Bike Barn 63  
 license 63
- Big West Conference** 68
- Bike Barn** 63, 70
- Biochemistry** 190
- Biochemistry and Molecular Biology, Graduate Group** 190
- Biochemistry, Molecular, Cellular and Developmental Biology** 190
- Biological and Agricultural Engineering** 192, 267
- Biological Chemistry** 190
- Biological Sciences, College of** 24, 75
- Biology**  
 Anatomy, Physiology and Cell 160  
 Animal 161, 162  
 Biochemistry 190  
 Biological Sciences 192  
 Biological Systems 269  
 Cell 199, 433, 583  
 Cellular 464  
 Conservation 232, 588  
 Developmental 199  
 Exercise 339  
 Fish 588  
 Fungal 349  
 Microbiology 457, 459, 584  
 Molecular 190, 464  
 Molecular Genetics 457  
 Nutritional 495  
 Plant 511, 513  
 Population 528  
 Wildlife 588
- Biology Academic Success Center** 75
- Biomedical Engineering** 272
- Biomedical Engineering, Graduate Group** 195
- Biophotonics Science and Technology, Center for** 31
- Biophysics, Graduate Group** 195
- Biostatistics, Graduate Group** 196
- Biotechnology** 197
- Biotechnology Engineering** 268
- Bodega Marine Laboratory and Reserve** 28, 34, 102
- Bodega Marine Laboratory Program** 102, 193, 198
- Botany** 199
- Breastfeeding Support Program, UC Davis** 64
- Buehler Alumni and Visitors Center** 71
- buses** 64
- Business Management** 199
- C**
- Cal Aggie Camp** 70
- Cal Aggie Foundation** 59
- Cal Aggie Marching Band Uh!** 67
- Cal Aggie Student Alumni Association (SAA)** 71
- calendar, academic**  
 Betty Irene Moore School of Nursing 144
- School of Law 132
- School of Medicine 139
- UC Davis 1
- California Aggie newspaper** 70
- California Agricultural Experiment Station** 30
- California Basic Skills Requirement** 127
- California National Primate Research Center (CPRC)** 28
- California Subject Examination for Teachers (CSET)** 127
- campus**  
 facilities map 649  
 tours 20
- Campus Copies** 70
- Campus Violence Prevention Program** 81
- cancellation/withdrawl** 56
- Cantonese** 199
- Capital Area North Doctorate in Educational Leadership (CANDEL)** 128
- Carl Gorman Museum** 70
- Cell and Developmental Biology, Graduate Group** 199
- Cell Biology** 199
- Cell Biology and Human Anatomy** 199
- Center for Applied Policy in Education (CAP-ED)** 258
- Center for Educational Effectiveness** 123
- Center for Leadership Learning** 82
- Center for Nano and Micromanufacturing** 32
- Center for Student Involvement** 67, 71
- certification**  
 full-time status 86  
 major degree  
*College of Agricultural and Environmental Sciences* 113  
*College of Letters and Science* 119
- Chancellor**  
 Office of the 70
- changing**  
 address 85  
 grades 78  
 major 87  
*College of Biological Sciences* 87  
*College of Engineering* 87  
 name 85
- Chemical Engineering** 277
- Chemistry** 199
- Chicana/Chicano Studies** 204
- Child and Family Studies, Center for** 31, 64
- child care**  
 breastfeeding support 64  
 community programs 64  
 grant program 64  
 on-campus 64  
 resources 64
- Child Development, Graduate Group** 207
- Chinese** 208
- Cinema and Digital Media** 208
- Civil and Environmental-Engineering** 282
- Civil Engineering** 283
- Class Search Tool** 85
- Classical Notes** 70
- Classics** 212
- Clinical Nutrition** 217
- Clinical Nutrition and Metabolism** 218
- Clinical Psychology** 218
- Clinical Research, Graduate Group** 218
- Coaching Principles and Methods** 218
- Coastal and Marine Sciences Institute** 32
- Coffee House** 67
- Coffee House (MU)** 70
- Cognitive Science** 218
- College Board Advanced Placement (AP) Examination Credit** 40, 41
- College of Agricultural and Environmental Sciences** 111
- College of Biological Sciences** 113
- College of Engineering** 115
- College of Letters and Science** 116
- College Teaching, Seminar in** 123
- Communication** 219
- Community and Regional Development** 222
- Community Development, Graduate Group** 225
- Community Nutrition** 226
- Community Service Resource Center** 80
- Companion and Captive Animals** 164
- Comparative Literature** 226
- computer** 27  
 email 27  
 help 27  
 multimedia 27

- printing 27  
 security 27  
 software 27  
 support 27
- Computer Science** 231  
**Computer Science, Graduate Group** 231  
**Computer Science-Engineering** 289  
**Computer Security Laboratory** 33  
**Concurrent-Open Campus** 91, 108, 112, 113, 117  
**conference**  
 rooms  
*Pavilion* 68  
**Conservation Biology** 232  
**Consumer Science** 232  
**Contemporary Leadership** 232  
**counseling** 64, 65  
 services 65
- courses**  
 100-199, description 148  
 1-99, description 148  
 200-299, description 148  
 300-399, description 148  
 400-499, description 148  
 adding 85  
**Aeronautical Science and Engineering (EAE)-Engineering** 313  
**African American and African Studies (AAS)** 150  
**Agricultural and Environmental Chemistry (AGC)** 153  
**Agricultural and Resource Economics (ARE)** 154  
**Agricultural Education (AED)** 153  
**American Studies (AMS)** 159  
**Anatomy, Physiology, and Cell Biology (APC)** 583  
**Anesthesiology and Pain Medicine (ANE)** 432  
**Animal Behavior (ANB)** 161  
**Animal Biology (ABI)**, graduate 162  
**Animal Biology (ABI)**, undergraduate 161  
**Animal Genetics (ANG)** 163  
**Animal Science (ANS)** 165  
**Anthropology (ANT)** 170  
**Applied Biological Systems Technology (ABT)** 175  
**Applied Science-Davis (EAD)-Engineering** 266  
**Arabic (ARB)** 213  
**Art History (AHL)** 178  
**Art Studio (ART)** 181  
**Asian American Studies (ASA)** 184  
**Astronomy (AST)** 506  
**Atmospheric Science (ATM)** 186  
 autotutorial 148  
 average units 86  
**Avian Sciences (AVS)** 188  
**Biochemistry, Molecular, Cellular and Developmental Biology (BCB)** 191  
**Biological Chemistry (BCM)** 433  
**Biological Sciences (BIS)** 193  
**Biological Systems (EBS)-Engineering** 269  
**Biomedical (BIM)-Engineering** 273  
**Biomedical Engineering (BIM)** 273  
**Biophotonics (BPT)** 267  
**Biophysics (BPH)** 196  
**Biostatistics (BST)** 197  
**Biotechnology** 198  
**Biotechnology (BIT)** 198  
**Cardiology (CAR)-Internal Medicine** 440  
**Cell Biology and Human Anatomy (CHA)** 433  
**Chemical (ECH)-Engineering** 279  
**Chemical and Materials Science (ECM)-Engineering** 278  
**Chemistry (CHE)** 200  
**Chicana/Chicano Studies (CHI)** 205  
**Chinese (CHN)** 246  
**Cinema & Technocultural Studies (CTS)** 209  
**Civil and Environmental (ECI)-Engineering** 284
- Classics (CLA)** 214  
 classification and numbering 148  
**Clinical Research (CLH)** 434  
**Communication (CMN)** 219  
**Community and Regional Development (CRD)** 223  
**Comparative Literature (COM)** 227  
**Computer Science (ECS)-Engineering** 290  
**Concurrent-Open Campus** 91, 108, 112, 113, 117  
**Consumer Science (CNS)** 232  
**Critical Theory (CRI)** 232  
**Cultural Studies (CST)** 234  
**Davis Honors Challenge (HNR)** 579  
 descriptions 149  
**Design (DES)** 235  
**Dramatic Art (DRA)** 570  
 dropping 85  
**East Asian Studies (EAS)** 250  
**Ecology (ECL)** 252  
**Economics (ECN)** 255  
**Education (EDU)** 259  
**Education Abroad Program (EAP)** 578  
**Electrical and Computer Engineering (EEC)-Engineering** 298  
**Emergency Medicine (EMR)** 436  
**Endocrinology and Metabolism (ENM)-Internal Medicine** 441  
**Engineering**  
*Aeronautical Science and Engineering (EAE)* 313  
*Applied Science-Davis (EAD)* 266  
*Biological Systems (EBS)* 269  
*Biophotonics (BPT)* 267  
*Chemical (ECH)* 279  
*Chemical and Materials Science (ECM)* 278  
*Civil and Environmental (ECI)* 284  
*Computer Science (ECS)* 290  
*Electrical and Computer Engineering (EEC)* 298  
*Engineering (ENG)* 265  
*Materials Science and Engineering (EMS)* 306  
*Mechanical (EME)* 311  
*Mechanical and Aeronautical Engineering (MAE)* 314  
**Engineering (ENG)** 265  
**English (ENL)** 317  
 enrolling in 85  
**Entomology (ENT)** 322  
**Environmental Horticulture (ENH)** 324  
**Environmental Science and Management (ESM)** 327  
**Environmental Science and Policy (ESP)** 329  
**Environmental Toxicology (ETX)** 332  
**Epidemiology (EPI)** 335  
**Evolution and Ecology (EVE)** 337  
**Exercise Biology (EXB)** 481  
 expanded descriptions 149  
 expected progress 86  
**Extension** 91, 108, 112, 113, 117  
**Family and Community Medicine (FAP)** 436  
**Fiber and Polymer Science (FPS)** 340  
**Film Studies (FMS)** 210  
**Food Science and Technology (FST)** 342  
**Food Service Management (FSM)** 344  
**Forensic Science (FOR)** 344  
**French (FRE)** 346  
**Freshman Seminar (FRS)** 341  
**Gastroenterology (GAS)-Internal Medicine** 441  
**General Medicine (GMD)-Internal Medicine** 441  
**Genetics (GGG)** 382  
**Geography (GEO)** 353  
**Geology (GEL)** 240  
**German (GER)** 355  
 grade levels 92  
**Greek (GRK)** 215  
**Health Informatics (MHI)** 360

- Hebrew (HEB) 216  
 Hematology-Oncology (HON)-Internal Medicine 441  
 Hindi (HIN) 216  
 History (HIS) 362  
 Horticulture (HRT) 371  
 Human Development (HDE) 372  
 Human Physiology (HPH) 438  
 Human Rights (HMR) 375  
 Humanities (HUM) 376  
 Hydrologic Science (HYD), graduate courses 377  
 Hydrologic Science (HYD), lower division courses 378  
 Immunology (IMM) 380  
 Infectious Diseases (IDI)-Internal Medicine 442  
 Integrated Studies (IST) 579  
 Internal Medicine (IMD) 439  
 Internal Medicine-Cardiology (CAR) 440  
 Internal Medicine-Endocrinology and Metabolism (ENM) 441  
 Internal Medicine-Gastroenterology (GAS) 441  
 Internal Medicine-General Medicine (GMD) 441  
 Internal Medicine-Hematology-Oncology (HON) 441  
 Internal Medicine-Infectious Diseases (IDI) 442  
 Internal Medicine-Nephrology (NEP) 442  
 Internal Medicine-Pulmonary Medicine (PUL) 442  
 Internal Medicine-Rheumatology-Allergy (RAL) 443  
 International Agricultural Development (IAD) 385  
 International Commercial Law (ICL) 387  
 International Relations (IRE) 523  
 Italian (ITA) 390  
 Japanese (JPN) 248  
 Jewish Studies (JST) 392  
 Landscape Architecture (LDA) 394  
 late add 85  
 late drop 85  
 Latin (LAT) 217  
 Law (LAW) 398  
 Linguistics (LIN) 408  
 load 86  
*limits* 86  
 Management (MGT/MGP) 412  
 Master of Public Health (MPH) 443  
 Materials Science and Engineering (EMS)-Engineering 306  
 Mathematical and Physical Sciences (MPS) 421  
 Mechanical (EME)-Engineering 311  
 Mechanical and Aeronautical Engineering (MAE)-Engineering 314  
 Medical Informatics (MDI) 360  
 Medical Microbiology (MMI) 443  
 Medical Pharmacology and Toxicology (PHA) 444  
 Medical Sciences (MDS) 429  
 Medicine and Epidemiology (VME) 583  
 Medicine, School of 428  
 Medieval Studies (MST) 456  
 Microbiology (MIC) 458  
 Middle East and South Asian Studies (MSA) 461  
 Military Science (MSC) 463  
 minimum progress requirements 86  
 Molecular and Cellular Biology (MCB) 466  
 Molecular Biosciences (VMB) 583  
 Molecular, Cellular, and Integrative Physiology (MCP) 468  
 Music (MUS) 470  
 Native American Studies (NAS) 476  
 Nematology (NEM) 479  
 Nephrology (NEP)-Internal Medicine 442  
 Neurobiology, Physiology, and Behavior (NPB) 482  
 Neurology (NEU) 445  
 Neuroscience (NSC) 486  
 Neurosurgery (NSU) 445  
 Nuclear Medicine (RNU) 454  
 Nursing (NRS) 488  
 Nutrition (NUT) 492  
 Nutritional Biology (NUB) 496  
 Obstetrics and Gynecology (OBG) 445  
 Open Campus-Concurrent 91, 108, 112, 113, 117  
 Ophthalmology (OPT) 446  
 Orthopaedic Surgery (OSU) 446  
 Otolaryngology (OTO) 447  
 Pathology (PMD) 447  
 Pathology, Microbiology, and Immunology (PMI) 584  
 Pediatrics (PED) 448  
 Performance Studies (PER) 497  
 Persian (PER) 217  
 Pharmacology and Toxicology (PTX) 498  
 Philosophy (PHI) 499  
 Physical Education (PHE) 503  
 Physicians Assistant Studies (PAS) 491  
 Physics (PHY) 506  
 Physiology 468  
 Plant Biology (PBI), graduate 514  
 Plant Biology (PLB), undergraduate graduate 512  
 Plant Pathology (PLP) 514  
 Plant Sciences (PLS) 517  
 Plastic Surgery (PSU) 456  
 Political Science (POL) 523  
 Population Biology (PBG) 529  
 Population Health and Reproduction (PHR) 585  
 Portuguese (POR) 555  
 prerequisites 148  
 Preventive Veterinary Medicine (MPM) 420  
 Psychiatry (PSY) 450  
 Psychology (PSC) 531  
 Public Health Sciences (SPH) 451  
 Pulmonary Medicine (PUL)-Internal Medicine 442  
 Radiation Oncology (RON) 453  
 Radiology-Diagnostic (RDI) 453  
 Radiology-Nuclear Medicine (RNU) 454  
 Religious Studies (RST) 536  
 repeating 94  
 research conference 148  
 Rheumatology-Allergy (RAL)-Internal Medicine 443  
 Russian (RUS) 539  
 Science and Society (SAS) 541  
 Science and Technology Studies (STS) 544  
 Social Theory and Comparative History (STH) 546  
 Sociology (SOC) 548  
 Soil Science (SSC) 552  
 Spanish (SPA) 555  
 Statistics (STA) 562  
 Study of Religion (SOR) 565  
 Surgery (SUR) 454  
 Surgery—Plastic Surgery (PSU) 456  
 Surgical and Radiological Sciences (VSR) 585  
 Sustainable Agriculture and Food Systems (SAF) 567  
 Technocultural Studies (TCS) 211  
 Textiles and Clothing (TXC) 569  
 Transportation Technology and Policy (TTP) 576  
 UC Davis Extension 91, 108, 112, 113, 117  
 UC Davis Washington Program (UCDC) 578  
 University Extension, UC Davis 91, 108, 112, 113, 117  
 University Writing Program (UWP) 580  
 variable unit 148  
 virtual (Internet) 148  
 Viticulture and Enology (VEN) 586  
 Wildlife, Fish and Conservation Biology (WFC) 589  
 Women's Studies (WMS) 350  
**Craft Center** 68  
**credit**  
 examination 90  
 limitations  
*College of Agricultural and Environmental Sciences* 111

- C**
- College of Biological Sciences 113
  - College of Letters and Science 116
  - transfer 40, 90
  - units 89
  - crime awareness 73
  - Critical Theory 232
  - Crocker Nuclear Laboratory 28
  - Crop Science and Management 233
  - cross enrollment, UC/CSU/Community College 91
  - Cross-Cultural Center 82
  - Cultural Studies, Graduate Group 233
- D**
- Data Analysis and Visualization Center, Institute for 28
  - Davis SHIP 56
  - degree check
    - College of Biological Sciences 114
    - College of Letters and Science 119
  - degrees
    - combined program
      - School of Law 131
      - School of Medicine 139
    - doctoral
      - Education (Ed.D.) CANDEL 127
    - graduate, advanced 121
    - Juris Doctor (J.D.) 131
    - majors 15
    - Master of Laws (LL.M.) 132
    - master's 122, 131
      - Education M.A. 127
    - minors 17
    - Ph.D. 122
      - Education 127, 128
    - School of Law 131
    - teaching credential/M.A. 127
  - Della Davidson Performance Studio 69
  - Dermatology 234
  - Design 234
  - Design Emphasis (NEB) 198
  - designated emphasis 122
  - Dietetics 238
  - directory, address 6
  - disabilities
    - Student Disability Center 77
    - students with 72
  - discrimination 78
  - dismissal 94
    - qualitative 95
    - quantitative 95
  - disqualification 94
  - Donald and Sylvia McLaughlin Reserve 34
  - Dramatic Art 238
  - dropping courses 85
  - drug abuse 73
- E**
- Early Childhood Lab School 64
  - Earth and Planetary Sciences 238
  - Earth Sciences 245
  - East Asian Languages and Cultures 245
  - East Asian Studies 250
  - Ecology, Graduate Group 251
  - Economics 254
  - Education Abroad
    - program 81
  - Education, Graduate Group 264
  - Education, School of 126, 258
  - Educational Opportunity Program (EOP) 77
    - services 79
  - electives, School of Engineering 116
- E**
- Electrical and Computer Engineering-Engineering 296
  - email
    - campus account 27
    - Gmail 27
  - employment, student 64
  - Endocrinology and Metabolism 265
  - Engineering 265
    - Agricultural and Natural Resources 268
    - Applied Science 266
    - Biological and Agricultural 267
    - Biomedical 272
    - Biotechnology 268
    - Chemical Engineering 277
    - Civil and Environmental 282
    - College of 24
    - Computer Science 289
    - Electrical and Computer Engineering 296
    - Food 268
    - Materials Science Engineering 305
    - Mechanical and Aeronautical 309
  - Engineers, Graduate Certificate Program 123
  - English 316
  - English Composition Examination 112, 114
  - enrolling in courses 85
  - Entertainment Council, ASUCD 70
  - Entomology 322
  - Entry Level Writing Requirement (English) 107
  - Environmental and Resource Sciences 324
  - Environmental Engineering 282
  - Environmental Geology 324
  - Environmental Horticulture 324
  - Environmental Horticulture and Urban Forestry 325
  - Environmental Policy Analysis and Planning 325
  - Environmental Science and Policy 328
  - Environmental Sciences 331
  - Environmental Toxicology 331
  - Epidemiology 334
  - Epidemiology, Graduate Group 334
  - Equestrian Center 67
  - Equine Science 164
  - Evolution and Ecology 336
  - examinations 91
    - accommodations
      - disability 92
      - religious 92
    - ACT 39, 52
    - advanced placement 40
    - AP, Advanced Placement 40, 41
    - College Board Advanced Placement (AP) Examination Credit 40, 41
    - date changes for final 91
    - English Composition 112, 114
    - final 91
      - Graduate Record (GRE) 123, 134
      - IB, International Baccalaureate 45
    - International Baccalaureate (IB) Higher Level Examination Credit 45
    - midterms 91
    - requirements for final 91
    - SAT requirement 39, 52
    - scheduling final 91
      - Test of English as a Foreign Language (TOEFL) 134
  - Exercise Biology 339
  - expenses 54
    - international student 54, 134
    - living 54
  - Experimental College 70
  - Exploratory Program 75
  - Extension, UC Davis 91, 108, 112, 113, 117
  - extracurricular activities 66

- F**
- Family and Community Medicine** 339
  - Farmers Market** 66
  - fees**
    - application, undergraduate 39
    - bicycle license 54
    - course materials 54
    - employee-student 54
    - late course add 85
    - late course drop 85
    - late registration 85
    - parking 54
    - part-time student 54
    - refunds 56
    - retroactive course add 86
    - service 54
    - transportation 54
    - UC employee-student 54
  - fellowships** 6, 123
    - graduate student 58, 123
  - Feminist Theory and Research** 339
  - Fiber and Polymer Science** 340
  - Film Studies** 341
    - financial aid 58, 123
  - Fine Arts Collection** 69
  - First-Year Seminar Program** 81, 341
  - Fisheries** 341
  - Food Engineering** 268
  - Food Science** 341
    - Food Science and Technology** 341
    - Food Science, Graduate Group** 341
    - Food Service Management** 343
    - Forensic Science, Graduate Group** 344
  - Free Application for Federal Student Aid (FAFSA)** 60, 123
  - French** 345
  - full-time student**
    - employment 64
    - status 86
  - Fungal Biology and Ecology** 349
- G**
- galleries**
    - art 69
    - Basement 69
    - Manetti Shrem Museum 69
  - Games Area** 67
  - Gender, Sexuality and Women's Studies** 349
  - General Education** 108
    - requirements
      - Fall 2011 and On* 109, 593
      - Pre-Fall 2011* 110, 617
      - theme options, *Pre-Fall 2012* 111
  - Genetics** 352
  - Genome Center** 33
  - Geographic Information Systems** 352
  - Geographic Studies** 352
  - Geography** 352
    - Geography, Graduate Group** 352
  - Geology** 238, 355
  - Geophysics** 355
  - Geotechnical Engineering** 283
  - Geotechnical Modeling, Center for** 31
  - German** 355
  - Global and International Studies** 359
  - Global Disease Biology** 359
  - government, student** 70
  - Governmental Affairs, Institute of** 29
  - Grade Change Committee** 98
  - grades** 92
    - availability, final 94
    - changes, retroactive 94
    - changing 78
    - GPA 92
    - incomplete 93
    - in-progress 93
    - mid-term standing 94
    - passed/not passed 92
    - point levels 92
    - releasing 73
    - repeating courses 94
    - satisfactory/unsatisfactory 93
    - SISWeb 94
  - Graduate Certificate Program for Engineers** 123
  - graduate group**
    - Agricultural and Environmental Chemistry 152
    - Animal Behavior 160
    - Animal Biology 162
    - Applied Mathematics 177
    - Atmospheric Science 188
    - Avian Sciences 189
    - Biochemistry and Molecular Biology 190
    - Biomedical Engineering, 195
    - Biophysics 195
    - Biostatistics 196
    - Cell and Developmental Biology 199
    - Child Development 207
    - Clinical Research 218
    - Community Development 225
    - Computer Science 231
    - Cultural Studies 233
    - Ecology 251
    - Education 264
    - Epidemiology 334
    - Food Science 341
    - Forensic Science 344
    - Geography 352
    - Health Informatics 360
    - Horticulture and Agronomy 370
    - Human Development 374
    - Hydrologic Sciences 376
    - Immunology 379
    - Integrative Genetics and Genomics 381
    - Integrative Pathobiology 383
    - International Agricultural Development 385
    - International Commercial Law 387
    - Linguistics 410
    - Master of Education (M.Ed.) 418
    - Medical Informatics 360
    - Microbiology 459
    - Molecular, Cellular, and Integrative Physiology 467
    - Neuroscience 486
    - Nutritional Biology 495
    - Performance Studies 497
    - Pharmacology and Toxicology 498
    - Plant Biology 513
    - Population Biology 528
    - Soils and Biogeochemistry 553
    - Statistics 565
    - Study of Religion 565
    - Textiles 568
    - Transportation Technology and Policy 575
    - Viticulture and Enology 588
  - Graduate Management Admission Test (GMAT)** 134
  - Graduate Record Examination (GRE)** 123, 134
  - graduate student**
    - deadlines 124
    - degrees 122
    - fellowships 58
    - funding 58

**Graduate Student Association** 68  
**Graduate Student Association (GSA)** 71  
**Graduate Studies** 25, 121  
 Office of 25  
**graduate study** 25  
**graduation**  
 filing dates 1  
 honors 96  
**grants** 58  
 Cal Grant A 58  
 Cal Grant B 58  
 Federal Pell 58  
 UC Grant 58  
**Greek** 360  
**Guardian Scholars Program (GSP)** 79

**H**

**harassment**  
 sexual 72

**Health and the Environment (CHE), Center for** 28

**Health Education and Promotion (HEP)** 66

**Health Informatics, Graduate Group** 360, 428

**health insurance** 56

**health services** 64, 65  
 alcohol prevention and treatment 66  
 drug abuse prevention and treatment 66  
 education 66  
 health educators, peer 66  
 HIV counseling and testing 66  
 promotion 66

**Hebrew** 361

**Hepatitis B** 85

**Herbarium, UC Davis** 35

**Hickey Pool** 67

**Hindi** 361

**History** 361

**History and Philosophy of Science** 370

**honorary societies** 97

**honors** 96  
 deans list 96  
 graduation 96  
 graduation, College of Letters and Science 96  
 program, College of Engineering 96  
 program, College of Letters and Science 96  
 University Honors Program 96, 579

**Horticulture and Agronomy, Graduate Group** 370

**housing**  
 dormitories 62  
 off-campus 63  
 on-campus 62  
 residence halls 62  
 student 62, 77  
*8th & Wake Apartments* 63  
*Cooperatives* 63  
*Russell Park Apartments* 63  
*Solano Park* 62  
*The Atriums at La Rue* 63  
*West Village* 63

**Human Anatomy** 371

**Human and Community Development** 371

**Human Development** 371

**Human Development, Graduate Group** 374

**Human Ecology** 374

**Human Performance Laboratory (HPL)** 33

**Human Rights** 375

**Humanities** 376

**Humanities Institute** 33

**Hutchison Child Development Center** 64

**Hydrologic Sciences, Graduate Group** 376

**Hydrology** 378

**I**

**Immunology, Graduate Group** 379

**Independent Study Program** 380

**Individual Major**  
 College of Agricultural and Environmental Sciences 380  
 College of Biological Sciences 381  
 College of Letters and Science 381

**Information and Educational Technology** 26

**Information Technology in the Interest of Society (CITRIS), Center for** 31

**Integrative Genetics and Genomics, Graduate Group** 381

**Integrative Pathobiology, Graduate Group** 383

**intercampus**  
 Exchange Program 123  
 visitor program 90

**Intercollegiate Athletics** 68

**Interior Design** 384

**Internal Medicine** 384

**International Agricultural Development** 384

**International Agricultural Development, Graduate Group** 385

**International and Community Nutrition** 386  
 program in 29

**International Baccalaureate (IB) Higher Level Examination Credit** 45

**International Commercial Law, Graduate Group** 387

**International English Language Testing System (IELTS)** 122

**International Relations** 389

**International Science Studies, minor** 389

**Internet**  
 access, campus 27  
 wired access 27  
 wireless access 27

**Internship** 389  
 program 389

**intramural**  
 clubs 68  
 sport clubs 67  
 sports 68

**Involvement Fair** 71

**Italian** 389

**iTunes** 27

**J**

**Jackson Hall** 69

**Japanese** 392

**Jepson Prairie Reserve** 34

**Jewish Studies** 392

**John Muir Institute of the Environment (JMIE)** 29

**L**

**Laboratory Animals** 164

**labs & rooms** 27

**Land, Air, and Water Resources** 393

**Landscape Architecture** 394

**Landscape Restoration** 397

**LaRue Park Child Development Center** 64

**Latin** 397

**Latin American and Hemispheric Studies** 397

**Law School Admission Test (LSAT)** 130, 131

**Law, School of** 129, 397  
 academic calendar 132  
 admission 130

**Lesbian, Gay, Bisexual and Transgender Resource Center** 82

**Letters and Science, College of** 25

**library**  
 Agricultural and Resource Economics 26  
 Blaisdell Medical Library 26  
 General 26  
 Loren D. Carlson Health Sciences 26  
 Physical Sciences & Engineering 26  
 Shields 26

- Linguistics 407  
**Linguistics, Graduate Group** 410  
**Literature in Translation** 411  
**Livestock and Dairy** 164  
**loans** 59  
  assistant 59  
  direct 58  
  Direct Grad Plus 59  
  Direct PLUS 59  
  emergency 59  
  Federal Direct parent 59  
  Federal Direct Subsidized 59  
  Federal Perkins 59  
  Health Profession student 59  
  short-term 59  
  undergraduate students 59  
  Unsubsidized William D. Ford Student 59  
**Luso-Brazilian Studies** 411
- M**
- majors** 15  
  changing 87  
  College of Agricultural and Environmental Sciences 86  
  College of Biological Sciences 86  
  College of Engineering 86  
  College of Letters and Science 87  
  cross-college  
    College of Agricultural and Environmental Sciences 88  
    College of Biological Sciences 88  
    College of Engineering 88  
    College of Letters and Science 88  
  declaration of 86  
  individual 89  
    College of Engineering 89  
  multiple  
    College of Agricultural and Environmental Sciences 87  
    College of Biological Sciences 87  
    College of Engineering 87  
    College of Letters and Science 87  
    Department of Computer Science 87  
  programs  
    College of Agricultural and Environmental Sciences 100  
    College of Biological Sciences 101  
    College of Engineering 103  
    College of Letters and Science 105
- Management, Graduate School of** 131, 134, 412
- Managerial Economics** 416  
**Manetti Shrem Museum** 69  
**Mann Laboratory, Louis K.** 33  
map, campus facilities 649  
marching band, Cal Aggie 67  
Marine and Coastal Science 417  
Master of Education (M.Ed.), **Graduate Group** 418  
Master of Preventive Veterinary Medicine 419  
Master of Professional Accountancy 418  
Master of Public Health (MPH) Degree 139  
master's and doctoral degree 122  
Masters, Ph.D.s and Postdoc Services 80  
Materials Science Engineering 305  
Maternal and Child Nutrition 420  
Mathematical and Physical Sciences 420  
Mathematics 421  
Mathematics and Science Teaching Program (MAST) 81  
Mechanical and Aeronautical-Engineering 309  
Medical College Admission Test (MCAT) 138  
Medical Informatics, **Graduate Group** 360  
Medical Microbiology 428  
Medical Pharmacology and Toxicology 428  
Medicine and Epidemiology 456  
Medicine, **School of** 138, 428
- Medieval and Early Modern Studies 456  
**Memorial Union (MU)** 67  
  Games Area 68  
**Mentorships for Undergraduate Research in Agriculture, Letters and Science (MURALS)** 79  
**Meteorology** 457  
**Mexican-American (Chicano) Studies** 457  
**Microbiology** 457  
**Microbiology, Graduate Group** 459  
**Middle East/South Asia Studies** 460  
**Military Science** 462  
**Mind and Brain, Center for** 31  
**minimum progress requirements** 86  
**minors** 17, 89  
  Education 126, 127  
  programs  
    College of Agricultural and Environmental Sciences 100  
    College of Biological Sciences 101  
    College of Engineering 103  
    College of Letters and Science 105  
**Molecular and Cellular Biology** 464  
**Molecular Biosciences** 464  
**Molecular Genetics** 457  
**Molecular Genomic Imaging (CMGI), Center for** 31  
**Molecular, Cellular, and Integrative Physiology, Graduate Group** 467  
**Mondavi Center for the Performing Arts** 69  
**Motorist Assistance Services** 63  
**Music** 469  
  Department of 69
- N**
- name change** 85  
**Nanomaterials in the Environment, Agriculture and Technology (NEAT)** 29  
**Native American Studies** 475  
**Natural Reserve System** 34  
**Natural Sciences** 479  
**Nematology** 322, 479  
**Neurobiology, Physiology, and Behavior** 479  
**Neurology** 487  
**Neuroscience** 485  
**Neuroscience, Center for** 32  
**Neuroscience, Graduate Group** 486  
**Neurosurgery** 487  
newspaper, California Aggie 70  
nondiscrimination 72  
Nuclear Magnetic Resonance Facility 34  
Nursing, Betty Irene Moore School of 141, 487  
Nutrition 492  
Nutrition Science 496  
Nutrition, Program in International and Community 29  
**Nutritional Biology, Graduate Group** 495
- O**
- Obstetrics and Gynecology** 496  
**Oceanography** 496  
**Open Campus-Concurrent** 91, 108, 112, 113, 117  
**Ophthalmology** 497  
**Organizational Studies** 497  
**Organized Research Units (ORUs)** 27  
Orientation 77  
Orthopaedic Surgery 497  
Otolaryngology 497  
Outdoor Adventures 68
- P**
- Pajamarino** 71  
**parking**  
  locations 649  
  permits 63  
**Parks and Recreation** 497

- part-time student**  
 employment 64  
 fees 54  
 minimum progress requirements 86  
 status 86
- Pathology** 497
- Pathology, Microbiology, and Immunology** 497
- Pavilion** 68
- Pediatrics** 497
- peer counseling**  
 health education 66  
 outreach presentations 66
- Peer Education and Community Empowerment (PEACE)** 82
- Performance Studies, Graduate Group** 497
- Pharmacology and Toxicology** 498
- Pharmacology and Toxicology, Graduate Group** 498
- Philosophy** 498
- photo ID, student** 85
- Physical Education** 503
- Physical Medicine and Rehabilitation** 504
- Physics** 504
- Physiology** 511
- Picnic Day** 70
- Planned Educational Leave Program (PELP)** 56, 98
- Plant Biology** 511
- Plant Biology, Graduate Group** 513
- Plant Diversity, UC Davis Center for** 35
- Plant Pathology** 514
- Plant Physiology** 516
- Plant Sciences** 516
- Plastic Surgery** 520
- podcasting** 27
- policy**  
 fee refund 56  
 lactation accommodation 64  
 residence 57  
 satisfactory academic progress 58  
 UC Education Finance 58  
 withdrawal 98
- Political Science** 520
- Pomology** 528
- Population Biology, Center for** 32
- Population Biology, Graduate Group** 528
- Population Health and Reproduction** 529
- Portuguese** 554
- Poultry** 164
- Precision Agriculture** 529
- prerequisites** 148
- Preventive Veterinary Medicine** 530
- priority registration** 85
- prizes** 96, 97  
 College of Agricultural and Environmental Sciences, 97  
 College of Biological Science 97  
 College of Engineering 97  
 College of Letters and Science 97  
 university medal 97
- probation** 94
- professional study** 26
- programs**  
 bachelor's degree requirements 106  
 Betty Irene Moore School of Nursing 141  
*Master of Health Services—Physician Assistant* 141  
*Master of Science—Leadership* 142  
*Master of Science—Nurse Practitioner* 142  
*Master of Science—Nurse Practitioner and Physician Assistant Dual-Track Program* 142  
*Nursing Science and Health-Care Leadership* 141, 487  
 college-wide  
*College of Agricultural and Environmental Sciences* 101
- College of Biological Sciences** 102
- collegewide**
- College of Letters and Science** 106
- combined degree**  
*School of Law* 131  
*School of Medicine* 139
- craft center** 67
- doctoral, Ph.D. in Education** 126
- elementary credential** 127
- graduate**  
*academic certificate* 123  
*academic certificate, College of Engineering* 123  
*admission* 121  
*Intercampus Exchange* 123  
**internship** 80
- master's**  
*Arts in Education* 126
- MBA**  
*working professionals, Graduate School of Management* 135
- School of Medicine** 139
- secondary credential** 127
- teacher credential**  
*M.A.* 126
- teaching**  
*Integrated Teaching Credential with Master's Degree* 126
- undergraduate**  
*College of Agricultural and Environmental Sciences* 100  
*College of Biological Sciences* 101  
*College of Engineering* 103  
*College of Letters and Science* 105
- Project Compost** 70
- Psychiatry** 530
- Psychology** 530
- Q**
- Quail Ridge Reserve** 34
- Quantitative Biology and Bioinformatics** 535
- quarter system, explanatory note** 149
- R**
- Radiation Oncology** 536
- radio station, KDV** 70
- Radiology** 536
- Range Science** 536
- readmission**  
 after an absence 98  
 deadlines for 98  
 graduate 121
- recreation** 66  
*Activities and Recreation Center (ARC)* 68  
 aquatics 67  
 athletics, intercollegiate 68  
 campus memberships 67  
 craft center 67  
*Equestrian Center* 67  
 fitness and wellness 67  
*Hickey Pool* 67  
 informal 67  
 intramural sports and clubs 67, 68  
*Memorial Union (MU)* 67, 68  
*Outdoor Adventures* 68  
*Recreation Swimming Pool* 67  
*Silo Union* 68
- Recreation Hall** 68
- Recreation Swimming Pool** 67
- refunds**  
 admission fee 56  
 after dismissal 95  
 after withdrawals 98  
 schedule of 56

- UC Davis Student Health Insurance Plan (Davis SHIP) 56
- registration**  
 late 85  
 late fee 85  
 online 85  
 priority 85  
 procedure 85  
 releasing materials 73  
 Schedule Builder 85  
 SISWeb 85
- Religious Studies** 536
- requirements** 122  
 area (breadth, College of Letters and Science 118  
 Bachelor, additional, College of Biological Sciences 114  
 bachelor's degree 106, 107  
 college 111  
*College of Agricultural and Environmental Sciences* 111  
*College of Biological Sciences* 113  
*College of Letters and Science* 116  
 university 107
- catalog rights  
*College of Agricultural and Environmental Sciences* 113  
*College of Biological Sciences* 114  
*College of Letters and Science* 119
- curriculum, College of Engineering 115
- declaration of major, College of Biological Sciences 114
- degree changes  
*College of Agricultural and Environmental Sciences* 113  
*College of Biological Sciences* 114  
*College of Letters and Sciences* 119
- degree check  
*College of Biological Sciences* 114  
*College of Letters and Science* 119
- English Composition  
*College of Agricultural and Environmental Sciences* 112  
*College of Biological Sciences* 114  
*College of Engineering* 116  
*College of Letters and Science* 117
- Entry Level Writing 107
- foreign language, College of Letters and Science 118
- General Education 108  
*Fall 2011 and On* 109  
*Pre-Fall 2011* 110
- graduate  
*English* 122
- prerequisites, College of Engineering 115
- residence  
*College of Agricultural and Environmental Sciences* 112  
*College of Biological Sciences* 113  
*College of Engineering* 115  
*College of Letters and Science* 117
- scholarship  
*College of Agricultural and Environmental Sciences* 112  
*College of Biological Sciences* 113  
*College of Engineering* 115  
*College of Letters and Science* 117
- subject, a-g 39
- units  
*College of Agricultural and Environmental Sciences* 111  
*College of Biological Sciences* 113  
*College of Engineering* 115  
*College of Letters and Science* 116
- residence**  
 appeals 57  
 classification  
*incorrect* 57  
*resident status* 57  
 deputy 57  
 determination date 57
- determination process 57  
 documentation 57  
 exemptions 57  
 guidelines 57  
 inquiries 57  
 minors 57  
 nonresident supplemental tuition 57  
 policy 57  
 rules 57  
*Statement of Legal Residence (SLA)* 85
- Resourcing Excellence in Education (REEd)** 258
- ROTC**  
*CSU Sacramento* 463  
 U.S. Air Force 463  
 U.S. Army 462  
 U.S. Navy 463  
*UC Berkeley* 463
- Russell Park Child Development Center** 64
- Russian** 539
- S**
- SAT Reasoning Test** 39, 52
- Schedule** 85
- Schedule Builder** 85  
 change address 85  
 class schedule, view 85  
 registration 85
- scholarships** 60  
 alumni 60  
 military 60  
 other 60  
 prestigious scholarships and fellowships 60  
 regents 60
- scholastic deficiencies** 94
- schools**  
 Education 126  
 Law 129  
 Management 131, 134  
 Medicine 138  
*Nursing, Betty Irene Moore School of* 141
- Science and Innovation Studies, Center for** 32
- Science and Society** 540
- Science and Technology Studies** 543
- security**  
 campus 73  
 computer 27
- senate bill 361** 91
- senate, ASUCD** 70
- services**  
 counseling 65  
 health 64
- Services for International Students and Scholars** 82
- sexual harassment** 72
- Sexuality Studies** 545
- shuttles** 63
- Silo Union** 68
- SISWeb**  
 change address 85  
 class schedule, view 85  
 registration 85
- Social and Ethnic Relations** 545
- Social Science Data Service** 34
- Social Sciences** 545
- social security numbers** 73
- Social Theory and Comparative History** 546
- Sociology** 546
- Soil and Water Science** 552
- Soil Science** 552
- Soils and Biogeochemistry, Graduate Group** 553
- Spanish** 554

- Special Transitional Enrichment Program (STEP)** 80  
**sports**  
 intercollegiate 68  
 intramural 68  
**standards**  
 qualitative 94  
 quantitative 95  
**Statement of Legal Residence (SLA)** 85  
**Statistics** 561  
**Statistics, Graduate Group** 565  
**Stebbins Cold Canyon Reserve** 34  
**store**  
 UC Davis 68  
**Structural Engineering** 283  
**Structural Mechanics** 283  
**student**  
 conduct 77  
 counseling 64, 65  
 court, ASUCD 70  
 disabilities, accommodations for students with 72  
 discipline 78  
 employment 64  
 Employment Center 64  
 graduate, designated emphasis 122  
 grievances 77  
 Health Services 64, 65  
 international 122, 134  
 misconduct 78  
 organizations 71  
 orientation 77  
 records, disclosure 72  
 responsibilities 78  
 transfer, School of Medicine 139  
**Student Academic Success Center** 79  
**Student Disability Center** 77  
**Student Farm** 81  
**Student Health & Wellness Center** 66  
**Student Involvement, Center for** 71  
**Student Parent Child Care Grant Program** 64  
**Study of Religion, Graduate Group** 565  
 study plan, approval, College of Agricultural and Environmental Sciences 112  
**Summer Sessions** 90  
**Surgery** 566  
**Surgical and Radiological Sciences** 566  
**Sustainable Agriculture and Food Systems** 566  
**Sustainable Environmental Design** 567  
**Sustainable Transportation Energy Pathways (STEPS)** 34  
**swimming pool**  
 Hickey 67  
 Recreation 67
- T**
- Tahoe Environmental Research Center (TERC)** 34  
**teaching**  
 assistantships 123  
 seminar on college 123  
**Technocultural Studies** 568  
**Test of English as a Foreign Language (TOEFL)** 122, 134  
**Textile Arts and Costume Design** 568  
**Textile Science** 568  
**Textiles and Clothing** 568  
**Textiles, Graduate Group** 568  
**The Buzz** 68  
**Theatre and Dance** 570  
 department of 69  
**tours, campus** 20  
**transcripts**  
 concurrent enrollment 94  
 Extension 50  
 official academic 94  
 UC Davis 94  
 UC Davis Extension 94  
**Transfer Reentry Veterans Center** 67  
**Transfer Reentry Veterans Center (TRV)** 79  
**transportation** 63  
 alternative 63  
 bicycles 63  
 buses 64  
*Unitrans* 64  
 Motorist Assistance Services 63  
 parking 63  
 shuttles 63  
**Transportation and Parking Services (TAPS)** 63  
**Transportation Planning** 283  
**Transportation Studies, Institute of** 29  
**Transportation Technology and Policy, Graduate Group** 575
- U**
- U.S. Air Force ROTC** 463  
**U.S. Army ROTC** 462  
**U.S. Navy ROTC** 463  
**U.S. Post Office, campus** 70  
**UC Agricultural Issues Center** 35  
**UC Davis Center for Plant Diversity** 35  
**UC Davis Design Museum** 69  
**UC Davis Equestrian Club** 67  
**UC Davis Extension** 91, 108, 112, 113, 117  
**UC Davis Faculty-Led Programs Abroad** 577  
**UC Davis Internships Abroad** 578  
**UC Davis Quarter Abroad** 81, 577  
**UC Davis Seminars Abroad** 81, 578  
**UC Davis Store** 67  
**UC Davis Stores** 68  
**UC Davis Student Health Insurance Plan (Davis SHIP)** 56  
**UC Davis Study Abroad** 80, 577  
 program 577  
**UC Davis Summer Abroad** 81, 577  
**UC Davis Welcome Center** 6  
**UC Education Abroad Program** 577  
**UC Office of the President** 70  
**UC Pathways** 40  
**UC Pavement Research Center** 34  
**UC Washington Center (UCDC)** 578  
**UC Washington Program (UCDC)** 578  
**UC/CSU/Community College cross enrollment** 91  
**undergraduate colleges**  
 Agricultural and Environmental Sciences 20  
 Biological Sciences 24  
 Engineering 24  
 Letters and Science 25  
**Undergraduate Education** 99  
 Office of 100  
**Undergraduate Research Center** 81  
**unions** 66  
**Unitrans buses** 64  
**units**  
 converting quarter to semester 89  
 credit 89  
 university requirements 108  
 variable 148  
**University Extension, UC Davis** 50, 91, 108, 112, 113, 117  
**University Honors Program** 96, 579  
**university medal** 97  
**university requirements** 107  
 American History and Institutions requirements 108  
 residence  
*state* 108  
 scholarship 108  
 units 108

- University requirements for the bachelor's degree** 107  
**University Writing Program** 112, 114, 580  
**Urban Planning** 583  
**Urology** 583
- V**  
**Vanderhoef Studio** 69  
**variable unit courses** 148  
**Vegetable Crops** 583  
**Veterinary Medicine, School of** 146, 583  
**violence prevention** 81  
**visas** 122  
**visitor**  
    center 20  
    program, intercampus 90  
**Viticulture and Enology** 585  
**Viticulture and Enology, Graduate Group** 588
- W**  
**War-Peace Studies** 588  
**Washington, D.C. Program** 81  
**Water Resources Engineering** 283  
**Water Science** 588  
**Welcome Center, UC Davis** 20  
**Wellness Portal** 66
- Whole Earth Festival** 70  
**Wildlife, Fish, and Conservation Biology** 588  
**Wine Production** 591  
**withdrawal**  
    College of Agricultural And Environmental Sciences 98  
    College of Engineering 98  
    retroactive 98  
    university 98  
**Women and Gender Studies** 591  
**Women's Resources and Research Center (WRRC)** 83  
**WorkLife and Wellness** 64  
**work-study** 60  
    community service 60  
    graduates 60  
    undergraduate 60
- X**  
**X-Ray Crystallographic Laboratory** 35
- Y**  
**YouTube** 27
- Z**  
**Zoology** 591

**NOTES**

---

# UC DAVIS CAMPUS FACILITIES MAP LEGEND

<b>Athletics</b>	
A Street Field .....	I-3
Aggie Field .....	V-2
Aggie Field Hockey Facility .....	A-3
Aggie Stadium .....	V-2
Dobbin's Baseball Complex .....	A-3
Hickey Gym .....	I-1
Howard Field .....	I-1
Hutchison Field .....	A-2
La Rue Field .....	A-1
Mary Welch Tennis Center .....	I-1
Schaal Aquatics Center .....	A-3
Russell Field .....	I-1
The Pavilion .....	A-2
Toomey Field .....	I-1
Solano Field .....	S-3
<b>Buildings</b>	
3rd & A .....	I-1
Academic Surge .....	V-3
Activities and Recreation Center .....	A-2
Advanced Materials Research Laboratory .....	V-4
Aggie Village .....	S-2
Agriculture Field Station .....	A-2
Arboretum Headquarters .....	V-4
Arboretum Teaching Nursery .....	A-4
ARC Pavilion .....	A-2
Art Annex .....	I-3
Art Building .....	I-2
Asmundson Hall .....	V-2
Bainer Hall .....	V-3
Bargain Barn .....	V-3
Bike Barn .....	I-2
Book Store .....	I-2
Bowley Plant Science Teaching Facility .....	A-3
Briggs Hall .....	V-2
Center for Child and Family Studies .....	S-2
Center for Companion Animal Health .....	A-4
Chancellor's Residence .....	I-1
Chemistry .....	I-3
Chemistry Annex .....	I-3
Cole Facility .....	V-4
Conference and Event Services .....	S-2
Conference Center .....	I-3
Cowell Building .....	V-1
Cruess Hall .....	V-1
Cuarto Residence Halls .....	A-1
Dairy Cattle Facility .....	D-3
Domes .....	A-1
Dutton Hall .....	I-2
Earth and Physical Sciences .....	I-3
Educational Opportunity Program .....	I-2
Ecology Laboratory .....	I-2
Environmental Horticulture .....	I-3
Equestrian Center Covered Arena .....	D-5
Everson Hall .....	I-2
Facilities Services .....	I-3
Fire & Police Building .....	V-1
Fleet Services .....	V-4
Food Science & Technology .....	V-2
Freeborn Hall .....	I-2
Gallagher Hall .....	I-3
Genome & Biomedical Sciences Facility .....	A-3
Giedt Hall .....	V-3
Gourley Clinical Teaching Center .....	D-4
Guilbert House .....	S-2
Haining Hall .....	V-2
Hart Hall .....	I-2
Heitman Staff Learning Center .....	I-3
Hickey Gym .....	I-1
Hoagland Hall .....	V-2
Human Resources Administration Building .....	A-1
Hunt Hall .....	I-1
Hutchison Child Development Center .....	A-2
Hutchison Hall .....	V-2
Hyatt Place .....	S-3
International House .....	I-1
Jackson Sustainable Winery .....	I-4
Jungerman Hall .....	I-3
Kemper Hall .....	V-3
Kerr Hall .....	I-2
King Hall .....	I-3
Kleiber Hall .....	V-2
La Rue Apartments .....	A-1
Life Sciences .....	V-2
Los Rios Community College .....	D-2
Maddy Lab .....	D-4
Mann Laboratory .....	V-2
Mathematical Sciences .....	I-3
Medical Sciences 1B .....	A-2
Medical Sciences 1C .....	A-3
Memorial Union .....	V-3
Meyer Hall .....	I-2
Mondavi Center .....	I-3
Mrak Hall .....	I-3
Music .....	I-2
Nelson Gallery .....	I-3
North Hall .....	I-2
Olson Hall .....	I-2
Orchard Park Apartments .....	A-1
Parsons Hall .....	A-2
Peter A Rock Hall .....	I-2
Physical Sciences and Engineering Library .....	I-3
Physics .....	I-3
Plant & Environmental Sciences .....	V-1
Plant Reproductive Biology Facility .....	A-2
Primerio Grove Apartments .....	V-1
Pritchard VMTH .....	I-3
Putah Creek Lodge .....	V-4
Regan Residence Halls .....	V-1
RMI Brewery, Winery and Food Pilot Facility .....	I-4
Robert Mondavi Institute for Wine and Food .....	I-2
Science .....	I-4
Robbins Hall .....	I-2
Robbins Hall Annex .....	I-2
Roessler Hall .....	I-3
Russell Park Apartments .....	A-1
Schaal Aquatic Center .....	A-3
Schalm Hall .....	A-4
School of Education .....	I-2
Sciences Lab .....	V-2
Freeborn Hall .....	I-2
Main Theatre—Wright Hall .....	I-2
Mondavi Center .....	I-3
ARC .....	A-2
Freeborn Hall .....	I-2
Memorial Union .....	I-2
Putah Creek Lodge .....	V-4
<b>Eateries</b>	
Bio Brew (Sciences Lab Building) .....	V-2
Coffee House (Memorial Union) .....	I-2
Gurock Pub (Silo) .....	D-2
Hyatt Place Gallery .....	I-2
Scrubs Café (Med Sci 1B) .....	A-4
Silo Union (Silo) .....	V-3
Starbucks (ARC) .....	V-2
<b>Galleries</b>	
Bohart Museum of Entomology (Academic Surge) .....	V-3
CN Gorman Museum (Hart Hall) .....	V-2
Design Museum and Design Collection (Cruess Hall) .....	I-2
Nelson Gallery .....	S-2
Shrem Museum of Art .....	I-3
The Gallery at the Memorial Union .....	I-2
<b>Gardens/ Outdoor Spaces</b>	
Animal Science GATEway Garden (7) .....	V-4
Arboretum Gateway Garden (21) .....	S-2
Arboretum Terrace Garden and Lois Crowe Patio (22) .....	S-2
California Foothill Collection (14) .....	S-2
Carolee Shields White Flower Garden and Gazebo (3) .....	A-5
Conifer Collection (10) .....	I-3
Desert Collection (13) .....	I-3
East Asian Collection (16) .....	I-3
Eric E Conn Acacia Grove (8) .....	V-4
Geology GATEway Garden (12) .....	I-3
Good Life Garden .....	I-4
Lake Spafford .....	I-3
Many Watts Brown Garden of California Native Plants (17) .....	I-3
Mediterranean Collection (5) .....	A-4
Native American Contemplation Garden (15) .....	I-3
Nature's Gallery Court (4) .....	A-4
North Coast Collection (18) .....	I-2
Peter J Shields Oak Grove (1) .....	A-5
Ruth Risdon Storer Garden (2) .....	I-3
Southwest USA and Mexican Collection (9) .....	V-4
South American Collection (6) .....	V-4
T Elliot Weier Redwood Grove (19) .....	S-2
Teaching Vineyard .....	V-4
The Quad .....	I-2
Vanderhoef Quad .....	I-2
Warren G Roberts Redbud Collection (11) .....	I-3
Wyatt Deck .....	I-3
<b>Performance Halls</b>	
Freeborn Hall .....	I-2
Main Theatre—Wright Hall .....	I-2
Mondavi Center .....	I-3
ARC .....	A-2
Freeborn Hall .....	I-2
Memorial Union .....	I-2
Putah Creek Lodge .....	V-4

# UC DAVIS CAMPUS FACILITIES MAP



